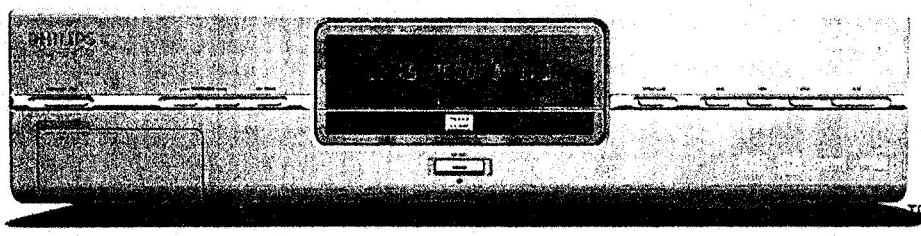
DVD-Video Recorder

DVDR880 & DVDR890
/001 /021 /051

Service
Service
Service



ServiceManual

CLASS 1
LASER PRODUCT

RW
DVD+ReWritable

DVD VIDEO

COMPACT disc DIGITAL VIDEO

COMPACT disc DIGITAL AUDIO

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1. Technical Specifications and Connection Facilities

1.1 General:

Mains voltage	: 198V-276V
Mains frequency	: 43 Hz - 63Hz
Power consumption mains	: 28 W
Power consumption standby	: < 7 W
Power consumption low power stand-by	: < 3 W

1.2 RF Tuner

Test equipment:Fluke 54200 TV Signal generator
Test streams:PAL BG Philips Standard test pattern

1.2.1 System:

PAL B/G, PAL D/K, SECAM L/L', PAL I

1.2.2 RF - Loop Through:

Frequency range	: 45 MHz - 860 MHz
Gain: (ANT IN - ANT OUT)	: -6 dB to 0dB

1.2.3 Radio Interference:

input voltage /3 tone method (+40 dB min)	: no limit

1.2.4 Receiver:

PLL tuning with AFC for optimum reception

Frequency range:	: 45.25 MHz - 857 MHz
Sensitivity at 40 dB S/N	: ≥ 60dBµV at 75Ω (video unweighted)

1.2.5 Video Performance:

Channel 25 / 503,25 MHz,
Test pattern: PAL BG PHILIPS standard test pattern,
RF Level 74 dBV
Measured on SCART 1

Frequency response:	: 0 - 4.00 MHz +0-4dB
Group delay (0.1 MHz - 4.4 MHz)	: 0 nsec ± 150nsec

1.2.6 Audio Performance:

Audio Performance Analogue - HiFi:

Frequency response at SCART 1 (L+R) output:	: 100 Hz - 12 kHz / 0± 3dB
S/N according to DIN 45405, 7, 1967 and PHILIPS standard test pattern video signal:	: FM: ≥ 50dB; AM ≥ 45dB, unweighted
Harmonic distortion (1 kHz, ± 25 kHz deviation):	: FM ≤ 1.5%; AM ≤ 2%

Audio Performance NICAM:

Frequency response at SCART 1(L+R) output:	: 40 Hz - 15 kHz 0 ± 3dB
S/N according to DIN 45405, 7, 1967 and PHILIPS standard test pattern video signal:	: ≥ 60 dB unweighted
Harmonic distortion (1 kHz):	: ≤ 0.5 %

1.2.7 Tuning

Automatic Search Tuning

scanning time without antenna	: typ. 3 min. PAL
stop level (vision carrier)	: ≥ 37dBµV
Maximum tuning error of a recalled program	: ± 62.5 kHz
Maximum tuning error during operation	: ± 100 kHz

Tuning Principle
automatic B,G, I, DK and L/L'detection
manual selection in "STORE" mode

1.3 Analogue Inputs

1.3.1 SCART 1 (Connected to TV)

Pin Signals:

1	- Audio R	1.8V RMS
2	- Audio R	
3	- Audio L	1.8V RMS
4	- Audio GND	
5	- Blue/Chroma GND	
6	- Audio L	
7	- Blue out/ Chroma in	0.7Vpp ± 0.1V into 75 Ohm (*)
8	- Function switch	<2V = TV >4.5V / <7V = asp. ratio 16:9 DVD >9.5V / <12V = asp. ratio 4:3 DVD
9	- Green GND	
10	- P50 control	
11	- Green	0.7Vpp ± 0.1V into 75 Ohm (*)
12	- Nc	
13	- Red/Chroma GND	
14	- fast switch GND	
15	- Red out/ Chroma out	0.7Vpp ± 0.1V into 75 Ohm (*) ± 3dB 0.3Vpp Chroma (burst)
16	- fast switch RGB/ CVBS	or Y <0.4V into 75 Ohm = CVBS >1V / <3V into 75 Ohm = RGB
17	- Y/CVBS GND OUT	
18	- Y/CVBS GND IN	
19	- CVBS/Y	1Vpp ± 0.1V into 75 Ohm (*)
20	- CVBS/Y	
21	- Shield	

1.3.2 SCART 2 (Connected to AUX)

Pin Signals:

1	-Audio R	1.8V RMS
2	-Audio R	
3	-Audio L	1.8V RMS
4	-Audio GND	
5	-Blue/Chroma GND	
6	-Audio L	
7	-Blue in/ Chroma out	± 3dB 0.3Vpp Chroma (burst)
8	-Function switch	
9	-Green GND	
10	-P50 control	
11	-Green	
12	-Nc	
13	-Red/Chroma GND	
14	-fast switch GND	
15	-Red in/ Chroma in	
16	-fast switch RGB/ CVBS or Y	
17	-CVBS GND OUT	
18	-CVBS GND IN	
19	-CVBS/Y/RGB sync	1Vpp ± 0.1V into 75 Ohm (*)
20	-CVBS/Y	
21	-Shield	

(*) for 100% white

1.3.3 Audio/Video Front Input Connectors

Audio

Input voltage	: 2 Vrms
Input impedance	: >10kΩ

Video - Cinch

Input voltage	: 1 Vpp ± 3dB
Input impedance	: 75 Ω

Video - YC (Hosiden)

Input voltage Y	: 1Vpp ± 3dB
Input impedance Y	: 75 Ω
Input voltage C	: burst 300 mVpp ± 3 dB
Input impedance C	: 75 Ω

1.4 Video Performance

All outputs loaded with 75 Ohm
SNR measurements over full bandwidth without weighting.

1.4.1 SCART (RGB)

SNR	: > -65 dB on all output
Bandwidth	: 4.8 MHz ± 2dB

1.5 Audio Performance CD

1.5.1 Cinch Output Rear

Output voltage 2 channel mode	: 2Vrms ± 2dB
Channel unbalance (1kHz)	: <1dB
Crosstalk 1kHz	: >95dB
Crosstalk 20Hz-20kHz	: >85dB
Frequency response 20Hz- 20kHz	: ±0.2dB max
Signal to noise ratio	: >95 dB
Dynamic range 1kHz	: >85dB
Dynamic range 20Hz-20kHz	: >80dB
Distortion and noise 1kHz	: >85dB
Distortion and noise 20Hz-20kHz	: >75dB
Intermodulation distortion	: >77dB
Mute	: >95dB
Outband attenuation:	: >40dB above 30kHz

1.5.2 Scart Audio

Output voltage 2 channel mode	: 1.6Vrms ± 2dB
Channel unbalance (1kHz)	: <1dB
Crosstalk 1kHz	: >85dB
Crosstalk 20Hz-20kHz	: >70dB
Frequency response 20Hz- 20kHz	: ± 0.2dB max
Signal to noise ratio	: >85 dB
Dynamic range 1kHz	: >75dB
Dynamic range 20Hz-20kHz	: >70dB
Distortion and noise 1kHz	: >75dB
Distortion and noise 20Hz-20kHz	: >65dB
Intermodulation distortion	: >70dB
Mute (spin-up, pause, access)	: >85dB
Outband attenuation:	: >40dB above 25kHz

1.6 Digital Output

1.6.1 Coaxial

CDDA/ LPCM (incl MPEG1)	: according IEC958
MPEG2, AC3 audio	: according IEC1937
DTS	: according IEC1937, amendment 1

1.7 Digital Video Input (IEEE 1394)

1.7.1 Applicable Standards

Implementation according:
IEEE Std 1394-1995
IEC 61883 - Part 1
IEC 61883 - Part 2 SD-DVCR (02-01-1997)
Specification of consumer use digital VCR's using 6.3 mm magnetic tape - dec.1994
Mechanical connection according:
Annex A of 61883-1

1.8 P50 System Control

Via SCART pin nr 10

1.9 Dimensions and Weight

Height of feet	: 10mm
Apparatus tray closed	: WxDxH :435 x 324.5 x 88cm
Apparatus tray open	: WxDxH :435 x 366 x 88cm
Weight without packaging	: app. 4 kg ± 0.5 kg
Weight in packaging	: app. 6.5 kg

1.10 Laser Output Power & Wavelength

1.10.1 DVD

Output power during reading	: 0.8mW
Output power during writing	: 20mW
Wavelength	: 660nm

1.10.2 CD

Output power	: 0.3mW
Wavelength	: 780nm

2. Safety Information, General Notes

2.1 Safety Instructions

2.1.1 General Safety

Safety regulations require that during a repair:
- Connect the unit to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol , only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:
- Route the wires/cables correctly, and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side:
  1. Unplug the mains cord, and connect a wire between the two pins of the mains plug.
  2. Set the mains switch to the 'on' position (keep the mains cord unplugged!).
  3. Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
  4. Repair or correct unit when the resistance measurement is less than 1 MΩ.
  5. Verify this, before you return the unit to the customer/ user (ref. UL-standard no. 1492).
  6. Switch the unit 'off', and remove the wire between the two pins of the mains plug.

2.1.2 Laser Safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

Laser Device Unit

Type	:	Semiconductor laser GaAlAs
Wavelength	:	650 nm (DVD)
	:	780 nm (VCD/CD)
Output Power	:	20 mW (DVD+RW writing)
	:	0.8 mW (DVD reading)
	:	0.3 mW (VCD/CD reading)
Beam divergence	:	60 degree

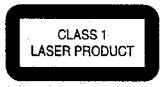

Figure 2-1

Note: Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

2.2 Warnings

2.2.1 General

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD,). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential.
  Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Be careful during measurements in the live voltage section. The primary side of the power supply (pos. 1005), including the heatsink, carries live mains voltage when you connect the player to the mains (even when the player is 'off'!). It is possible to touch copper tracks and/or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A 'lightning stroke' and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.
- Never replace modules, or components, while the unit is 'on'.

2.2.2 Laser

- The use of optical instruments with this product, will increase eye hazard.
- Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.
- Repair handling should take place as much as possible with a disc loaded inside the player.
- Text below is placed inside the unit, on the laser cover shield:

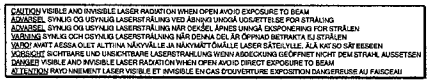

Figure 2-2

2.2.3 Notes

Dolby
Manufactered under licence from Dolby Laboratories. "Dolby", "Pro Logic" and the double-D symbol are trademarks of Dolby Laboratories. Confidential Unpublished Works.
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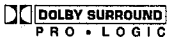


Figure 2-3

Trusurround
TRUSURROUND, **SRS** and symbol (fig 2-4) are trademarks of SRS Labs, Inc. TRUSURROUND technology is manufactured under licence frm SRS labs, Inc.

Figure 2-4

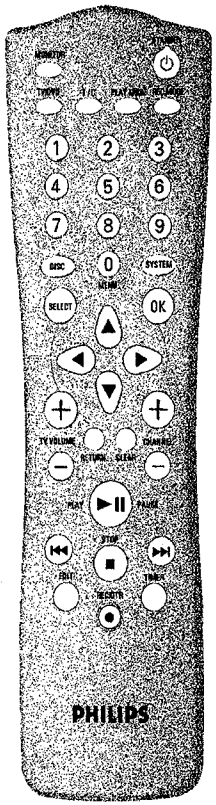
Video Plus
"Video Plus+" and "PlusCode" are registered trademarks of the Gemstar Development Corporation. The "Video Plus+" system is manufactored under licence from the Gemstar Development Corporation.

Figure 2-5

Macrovision
This product incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners.
Use of this copyright protection technology must be autorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

3. Directions For Use

The remote control



MONITOR	**Monitor**: This button lets you switch between the (internal) TV tuner in the DVD recorder (TV picture on the TV set) and playback on the DVD recorder.
STANDBY ⏻	**Switch on or off**: To switch set on or off, interrupt menu function, interrupt a programmed recording (TIMER)
TV/DVD	**TV/DVD switch**: Switches the scart socket **EXT 2 AUX I/O** directly to the TV set. This lets you watch the picture from any unit connected to this scart socket (set-top box', video recorder or satellite receiver) and at the same time record from another source. If you have not connected a device to scart socket **EXT 2 AUX I/O** you can use this button to switch between TV reception and DVD recorder. This, however, functions only if you have connected your TV set to the DVD recorder using a scart cable (socket **EXT 1 TO TV-I/O**) and your TV set reacts to the switching.
T/C	**Title/Chapter**: Choose the 'T'(Title)/'C'(Chapter) directly from the menu bar If 'INFO' appears in the display, the index menu from a recorded disc or an introductory film will be shown. In this case, this function is not available.
PLAY MODE	**Playback type**: Choose between repeat, shuffle play and intro-scan
REC. MODE	**Record type (quality)**: To select the maximum possible record time
0..9	**Number buttons**: 0 - 9
DISC-MENU	**Disc menu**: To show the DVD menu or the index screen
SYSTEM-MENU	**System menu**: Call up/cancel the main menu (menu bar at the top of the screen)
SELECT	**Select**: Select function/value
OK	**Store/confirm**: To store or confirm entry
◄ ► ▲ ▼	**Cursor keys**: Left, right, up, down
RETURN	**Back**: Return to previous menu on a video CD (VCD). This function works also on some DVD's.
CLEAR	**Delete**: To delete last entry or clear programmed recording (TIMER)
CHANNEL +	**Plus**: Next programme number
CHANNEL −	**Minus**: Previous programme number
PLAY/PAUSE ►II	**Playback/pause**: Play back a disc. If this button is pressed during playback, the DVD recorder switches to pause. You will see a still picture. If this button is pressed during recording, the DVD recorder will also switch to pause.
⏮	**Select previous title/search backwards**: Briefly press the button during playback: Previous chapter/film or previous title Hold down the button: Search backwards Hold down the button during the still picture: slow motion backwards
⏭	**Select next title/search forwards**: Briefly press the button during playback: Next chapter/film or next title Hold down the button: Search forwards Hold down the button during the still picture: slow motion forward
STOP ■	**Stop**: Stop playback / recording, except with programmed recordings (TIMER) Hold down the button to open and close the disc tray.
REC/OTR ●	**Record**: Record the current TV channel.
EDIT	**EDIT**: For displaying the edit menu for DVD+(RW) discs, for setting chapter markers
TIMER	**TIMER**: To program a recording with ShowView® / without ShowView® or to alter/clear programmed recordings

Additional TV functions

TV VOLUME +	**TV volume**: Increase TV volume
TV VOLUME −	**TV volume**: Reduce TV volume

For the following functions you need to hold down the button **DVD/TV** at the side and then select the function you need with the appropriate button.

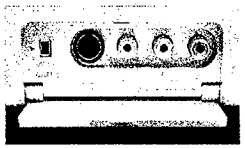
0..9	**Number buttons**: 0 - 9
CHANNEL +	**TV programme number**: To select a higher programme number
CHANNEL −	**TV programme number**: To select a lower programme number

Front of the device

STANDBY/ON	**Switch on or off**: To switch off or on, interrupt a function, interrupt a programmed recording (TIMER)
CHANNEL −	**Select**: Lower programme number
CHANNEL +	**Select**: Higher programme number
REC MODE	**Record type (quality)**: To select the maximum possible record time

RECORD	**Record:** Record the current TV channel
RECORD LED	**Recording in progress:** Red light on the **RECORD** button to indicate recording in progress
OPEN/CLOSE	**Open/close disc tray:** Open/close disc tray
⏮	Select previous title/search backwards
⏭	Select next title/search forwards
■STOP	**Stop:** Interrupt playback/recording
► PLAY/PAUSE	**Playback/pause:** Play back recorded disc, interrupt playback, still picture

Behind the flap at the left-hand corner on the front



DV	**i-Link / DV socket (digital video input, IEEE 1394, FireWire):** Connecting a digital camcorder or other suitable device (programme number 'CAM 2').
S-VIDEO	**S-Video socket:** Connection of SVHS/Hi8 camcorders or SVHS/Hi8 video recorders (programme number 'CAM 1')
Yellow socket VIDEO	**Video input socket:** Connection of camcorders or video recorders (programme number 'CAM 1')
White/red socket left AUDIO right	**Audio input socket left/right:** Connection of camcorders or video recorders (programme number 'CAM 1')

Switching between sockets **IN S-VIDEO (Y/C)** and **IN VIDEO (CVBS)** is done automatically. In case both sockets are used, the signal received at socket **IN S-VIDEO (Y/C)** is treated with priority.

Back of the unit

~MAINS	**Mains socket:** Connection to the mains supply (230V/50Hz)
ANTENNA	**Aerial input:** Connection of the aerial
TV	**Aerial output:** Connection of the TV set
EXT 2 AUX I/O	**Scart socket 2:** Connection of an additional device (satellite receiver, set-top box, video recorder, camcorder, etc.)
EXT 1 TO TV-I/O	**Scart socket 1:** Connection of a TV set. RGB- output
OUT S-VIDEO (Y/C)	**S-Video output:** Connection of an S-Video compatible TV set
OUT VIDEO (CVBS)	**Video output (yellow socket):** Connection of a TV set with a video input (CVBS, Composite Video)
OUT L AUDIO R	**Analogue audio output (white/red socket):** Connection of a TV set with audio input sockets or connection of an additional device
DIGITAL AUDIO OUT	**Digital audio output:** Connection of a digital audio device (amplifier/receiver)

The symbols on your DVD recorder display

These symbols can light up on your DVD recorder display:

TITLE	Displays the title number selected/played (DVD)
TRACK	Displays the track selected/played (VCD/CD)
DVD+RW	Displays the inserted DVD disc: DVD /DVD+R / DVD+RW. Disc types 'DVD-R/DVD-RW.' are shown as DVD.
S-VCD	Displays the CD-disc inserted: S VCD/VCD/CD
88+	Displays recording type (Quality)/Playback type HQ, SP+, EP, EP+
CHAPTER	Displays the chapter selected/played
TOTAL TIME	Total playback time
REMAIN TIME	Time remaining
TIME	Time used
DTS	A DTS audio signal is available on the digital audio output
DD DIGITAL	A Dolby digital audio signal is available on the digital audio output
MPEG	An MPEG audio signal is available on the digital audio output
PCM	A PCM audio signal is available on the digital audio output
CHANNEL	Channel/programme number
►	Playback in progress
II	Playback/record interrupted (Pause)
RECORD	Recording in progress
	A satellite recording has been programmed.
o((	A remote control signal has been received
⏲	A recording (timer) has been programmed
DECODER	A decoder has been assigned to the current TV channel (programme)

VPS/PDC	Video programming system / programme delivery control: A VPS or PDC code will be transmitted for the selected TV program
NICAM	The DVD recorder has detected a Nicam audio signal.
STEREO	During playback a HiFi/2 channel tone was detected or a HiFi/2 channel tone was received
▮▮▮▮	Multi-function display/Text line •) Clock •) Disc/title playing time •) OTR switch-off time •) Title name •) Display of programme number of TV channel/position/channel name/function. •) Display of informations, warnings.

Messages in the DVD recorder display

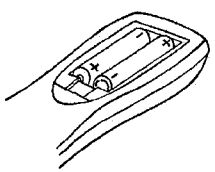
The following messages may appear in your DVD recorder display

TV ON	The DVD recorder is currently in the initial installation mode. Switch on your TV set and read section 'Installing your DVD recorder' in chapter 'Initial Installation'.
NO SIGNAL	No input signal available (signal inadequate or unstable)
MENU	The menu on the screen is active
OPENING	Disc tray opening
TRAY OPEN	Disc tray open
CLOSING	Disc tray closing
READING	Disc being read
MENU UPDT	Once recording has been successfully completed the table of contents is created.
INIT MENU	The menu structure is created after the first recording has been made on a new disc
COPY PROT	You have tried to copy a copy-protected DVD/video cassette.
WAIT	Please wait until this message disappears. The DVD recorder is busy performing a task.
NO DISC	No disc has been inserted for recording. If a disc has been inserted, perhaps it cannot be read.
INFO	Information on the inserted DVD is displayed on the screen
BUSY	The DVD recorder is processing the changes to make them DVD compatible
ERASING	The entire disc is erased
EMPTY DISC	The disc inserted is either new or has been completely erased (no recordings).
PROTECTED	The disc is protected against recording
MAX TITLE	The maximum number of titles per disc has been reached. The maximum number of titles per disc is 48.
MAX CHAP	The maximum number of chapters per title/disc has been reached. The maximum number of chapters per title is 99, and 124 per disc.
DISC FULL	The disc is full. There is no space for new recordings
PAL DISC	A disc with PAL recordings has been inserted. The machine is trying to record an NTSC signal. Insert a new disc or one that contains NTSC recordings.
NTSC DISC	A disc with NTSC recordings has been inserted. The machine is trying to record a PAL signal. Insert a new disc or one that contains PAL recordings.
RECORDING	An illegal action (e.g. **OPEN/CLOSE** button) was attempted during recording
FREE TITLE	Playback was started for an empty title or the following title is empty
DISC LOCK	An attempt has been made to record during playback of a protected disc. This messsage appears if an attempt is made to insert a chapter marker (**EDIT** button).
DISC ERR	An error occurred when the title was being written. If this error keeps occurring, please clean the disc or use a new one. You will find information on how to clean the disc in the next chapter in the section 'Cleaning the discs'.
DISC WARN	An error occurred when writing the title. Recording was continued; the error was skipped
SETUP	After the automatic channel search, the menu for time/date settings appears on the screen.
WAIT 01	During the automatic channel search, the TV channels found will be count
BLOCKED	It is not possible to close/open the disc tray.
SAFE REC0	The new recording will be made at the end of all the other recordings (SAFE RECORD).
EASY LINK	The 'EasyLink' function is currently transferring information from the TV set.

2 Connecting the DVD recorder

ENGLISH

Preparing the remote control for operation



The remote control and its batteries are packed separately in the original DVD recorder packaging. You must install the batteries in the remote control before use - described in the following section.

1. Take the remote control of the DVD recorder and the enclosed batteries (2 batteries).
2. Open the battery compartment, insert the batteries as shown and then close the battery compartment.

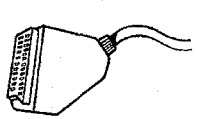
The remote control is now ready to use.
Its range is approximately 5 to 10 meters.

'Aim' correctly
In the following sections, you will need the remote control for the first time. Always point the front of the remote control at the DVD recorder and not at the TV set.

Connecting your DVD recorder to the TV set

The necessary cable connections must be made before you can record or playback TV programmes using your DVD recorder.

Connect the DVD recorder **directly** to your TV set. If there is a video recorder in between the picture quality may be poor because of the copy protection system built into the DVD recorder.
We recommend that you use a scart cable to connect your TV set and DVD recorder.



What is a scart cable?
The scart or Euro AV cable serves as the universal connector for picture, sound and control signals. With this type of connection, there is practically no loss of quality in picture or sound transmission.

When you install your DVD recorder for the first time, select one of the following options:

'Connecting with a scart cable and Easy Link'
If your TV set is equipped with 'Easy Link, Cinema Link, NexTView Link, Q-Link, Smart Link, Megalogic, Datalogic, ...' and you wish to use a scart cable.

What is Easy Link?
If your TV set is equipped with functions such as Easy Link, Cinema Link, NexTView Link, Q-Link, Smart Link, Megalogic or Datalogic, which are fully compatible with one another (TV set, DVD recorder, etc.), your DVD recorder can exchange information with your TV set. Please see your TV's operating instructions.

'Connecting with a scart cable without Easy Link'
If your TV set is not equipped with 'Easy Link, Cinema Link, NexTView Link, Q-Link, Smart Link,, Megalogic, Datalogic, ...' and you wish to use a scart cable.

'Connecting with an S-Video (Y/C) cable'
If your TV set is equipped with an S-Video (SVHS) socket.

What is an 'S-Video (Y/C) cable'?
This connecting cable, also known as the SVHS cable, is used to transmit the brightness signal (Y signal) and colour signal (C signal) separately. This mini DIN socket/plug is also called a Hosiden socket/plug.

'Connecting with video (CVBS) cable'
If your TV set is equipped only with a video (CVBS) socket.

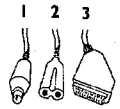
What is 'Video (CVBS)'?
This socket, usually referred to as the Cinch socket, is used for transmitting the composite video signal (FBAS, CVBS). In this method of transmission the colour signal and the brightness signal are transmitted on the same cable. In certain circumstances, this can lead to problems with the picture, such as 'Moiré' patterns.

Connecting with a scart cable and 'Easy Link'

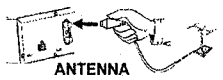
ENGLISH

easyLINK

Your DVD recorder can exchange information with your TV set using 'Easy Link'. Your TV channels can also be transferred in the same order from your TV set to your DVD recorder using 'Easy Link'.

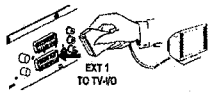


Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), a special scart cable (3, suitable for Easylink).

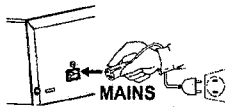


1. Switch off your TV set.
2. Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA** socket at the back of the DVD recorder.

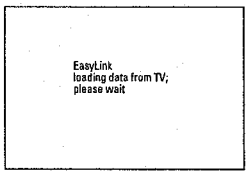
3. Insert one end of the supplied aerial cable into the **TV** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.



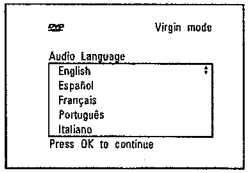
4. Plug a special scart cable (for Easylink) into the scart socket **EXT 1 TO TV-I/O** at the back of the DVD recorder and the corresponding scart socket at the back of the TV set (see TV set operating instructions).
5. Switch on the TV set.



6. Insert one end of the supplied mains cable into the mains socket ~**MAINS** at the back of the DVD recorder and the other end into the wall socket.



7. A message appears on the screen announcing that the transfer has started. 'EASY LINK' appears on the display during transfer.
The TV set transfers all stored TV channels, in the same order, to the DVD recorder.
This may take several minutes.



*** 'Time', 'Year', 'Month', 'Date' appears on my TV screen for confirmation**

Normally, the date and time are transferred from the data of the TV channel that is stored under programme P01. If the aerial signal is too weak or disrupted, you must manually set the time and date:

1. Check if the time in line **'Time'** is correct.
2. If required, change the time with the number buttons **0..9** on your remote control.
3. Select the next line with ▲ or ▼.
4. Check the displayed settings for: **'Year'**, **'Month'** and **'Date'**.
5. When all information is correct, save by pressing **OK**.

Problem

*** I can see more installation menus on my TV set**

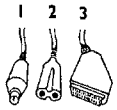
Not all the necessary data has been transferred. Please enter the settings by hand as follows. For more information on the various functions see 'Initial installation' in 'Installing your DVD recorder'.

1. Select the desired audio language using ▼ or ▲ and confirm with **OK**.
2. Select the desired subtitle language with ▼ or ▲ and confirm with **OK**.
3. Select the desired picture format using ▼ or ▲.
   - **'4:3 letterbox'** For a 4:3 TV set; cinema format (black bars above and below the picture)
   - **'4:3 panscan'** For a 4:3 TV set; full height format with the sides cut off
   - **'16:9'** For a 16:9 TV set
4. Confirm with **OK**.
5. Select your country with ▼ or ▲.
   If your country does not appear, select **'Other'**.
6. Confirm with **OK**.

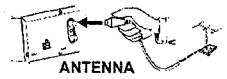
Problem

Initial installation is now complete.

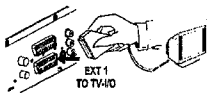
Connecting with a scart cable without 'Easy Link'



Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), a scart cable (3).



1. Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA** socket at the back of the DVD recorder.



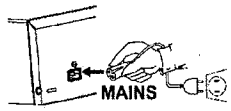
❷ Insert one end of the supplied aerial cable into the **TV** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.

❸ Plug a scart cable into the scart socket **EXT 1 TO TV-I/O** at the back of the DVD recorder and the scart socket for the DVD recorder at the back of the TV set (see TV set operating instructions).

My TV set has several scart sockets. Which one should I use?
Select the scart socket that is suitable for both video output and for video input.
My TV set shows me a selection menu for the scart socket
Select 'VCR' as the source for this scart socket.

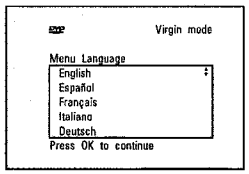
ENGLISH

❹ Switch on the TV set.



❺ Insert one end of the supplied mains cable into the mains socket ~**MAINS** at the back of the DVD recorder and the other end into the wall socket. '*TV ON*' will appear on the display.

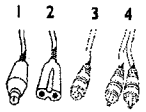
❻ If the connection was properly made and your TV was **automatically switched** to the programme number for the scart socket, e.g. 'EXT', '0', 'AV', you will see the following picture:



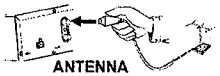
× My screen is empty.
✓ Many TV sets are switched by the DVD recorder to the programme number for the scart socket by way of a control signal sent through the scart cable.
✓ If the TV set does not automatically switch to the scart socket programme number, manually change to the corresponding programme number on your TV set (see your TV's operating instructions).
✓ Check that the scart cable is connected from the TV set to the **EXT 1 TO TV-I/O** socket on the DVD recorder. The **EXT 2 AUX I/O** socket is intended only for additional devices.

Then, read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

Connecting with an S-Video(Y/C)cable

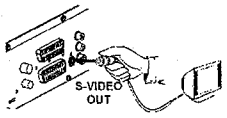


Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), an S-Video (SVHS) cable (3), an audio cable (4, supplied, red/white plug).

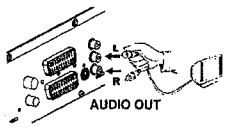


❶ Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA** socket at the back of the DVD recorder.

❷ Insert one end of the supplied aerial cable into the **TV** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.

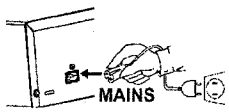


❸ Insert one end of a S-Video (SVHS) cable into the **OUT S-VIDEO (Y/C)** socket at the back of the DVD recorder and the other end into the S-Video (SVHS) input socket on the TV set (usually labelled 'S-Video in' or 'SVHS in'. See TV operating instructions).



❹ Insert one end of the supplied audio (Cinch) cable into the red/white Cinch socket **OUT L AUDIO R** at the back of the DVD recorder and the other end into the audio input socket (usually red/white) on the TV set (usually labelled 'Audio in' or 'AV in'. See TV operating instructions).

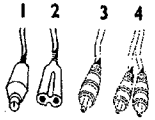
❺ Switch on the TV set. Switch the TV set over to this input socket or select the relevant channel number. Please see your TV's operating instructions for the channel number you need.



❻ Insert one end of the supplied mains cable into the mains socket ~**MAINS** at the back of the DVD recorder and the other end into the wall socket. '*TV ON*' will appear on the display.

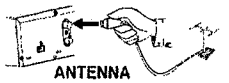
Then, read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

Connecting with video(CVBS) cable



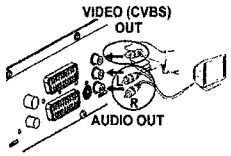
ENGLISH

Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), a video (CVBS) cable (3, supplied, yellow plug), an audio cable (4, supplied, red/white plug).



❶ Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA** socket at the back of the DVD recorder.

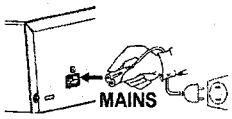
❷ Insert one end of the supplied aerial cable into the **TV** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.



❸ Insert one end of the supplied video (CVBS) cable into the yellow Cinch socket **OUT VIDEO (CVBS)** at the back of the DVD recorder and the other end into the video input socket (usually yellow) on the TV set (usually labelled 'Video in' or 'AV in'. See TV operating instructions).

❹ Insert one end of the supplied audio (Cinch) cable into the red/white Cinch socket **OUT L AUDIO R** at the back of the DVD recorder and the other end into the audio input socket (usually red/white) on the TV set (usually labelled 'Audio in' or 'AV in'. See TV operating instructions).

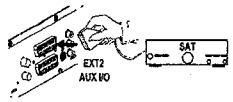
❺ Switch on the TV set. Switch the TV set over to the Video/Audio input socket or select the relevant programme number. Please see your TV's operating instructions for the programme number you need.



❻ Insert one end of the supplied mains cable into the mains socket ∿**MAINS** at the back of the DVD recorder and the other end into the wall socket. '*TV ON*' will appear on the display.

Then, read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

Connecting additional devices to the second scart socket



You can connect additional devices such as decoders, satellite receivers, camcorders, etc. to the **EXT 2 AUX I/O** socket. When playback is started on this additional device the DVD recorder automatically connects the **EXT 2 AUX I/O** scart socket with the **EXT 1 TO TV-I/O** scart socket. You will then see the picture from the additional device on your TV set, even if the DVD recorder is switched off.
The **TV/DVD** button on the remote control allows you to switch between playback through the **EXT 2 AUX I/O** scart socket and playback from the DVD recorder.

Connecting additional video recorders

You can connect a video recorder to the **EXT 2 AUX I/O** socket. If you have an SVHS video recorder you can additionally use the **OUT S-VIDEO (Y/C)** socket and the **OUT L AUDIO R** sockets.

Please note:
Most pre-recorded video cassettes and DVDs are copy-protected. If you try to copy them you will see the message '*COPY PROT*' on the DVD recorder's display.

×When copying video cassettes the display on the DVD recorder shows '*NO SIGNAL*'.
✓ Check that the scart cable is plugged in firmly.
✓ The DVD recorder may not be able to recognise the video input signal if this signal is poor or does not comply with relevant standards.

×When I copy DVD video discs or pre-recorded video cassettes the picture is fuzzy and the brightness varies
✓ This happens if you try to copy DVDs or video cassettes that have been copy-protected. Even though the picture on the TV is fine the recording on a DVD+R(W) is faulty. This interference is unavoidable with copy-protected DVDs or video cassettes.

Problem

Connect camcorder to the front sockets

To copy camcorder recordings, you can use the front sockets. These sockets are located behind the flap on the left hand side.

ENGLISH

Best Picture Quality

If you have a DV or Digital 8 camcorder, connect the **DV** input of the DVD recorder to the appropriate DV output on the camcorder.

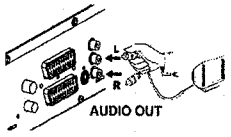
Very good Picture Quality

If you have a Hi8 or S-VHS(C) camcorder, connect the **S-VIDEO** input of the DVD recorder to the appropriate S-VHS output on the camcorder.
You must also connect the audio input **left AUDIO right** on the DVD recorder to the audio output on the camcorder.

Good Picture Quality

If you have a camcorder that only has a single video output (Composite Video, CVBS), connect the **VIDEO** input on the DVD recorder to the appropriate output on the camcorder.
You must also connect the audio input **left AUDIO right** on the DVD recorder to the audio output on the camcorder.

Connecting audio devices to the analogue audio sockets

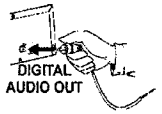


Two analogue audio sockets **OUT L AUDIO R** (audio signal output left/right) are located at the back of the DVD recorder.

These can be used to connect the following:
- **a receiver with Dolby-Pro-Logic**
- **a receiver with two-channel analogue stereo**

Can I use the 'Phono' input on my amplifier?
This socket (input) on the amplifier is designed only for record players without preamplifiers. Do **not** use this input for connecting the DVD recorder.
The DVD recorder or the amplifier may be damaged as a result.

Connecting audio devices to the digital audio socket



At the back of the DVD recorder there is a digital audio output socket **DIGITAL AUDIO OUT** for an coaxial cable.

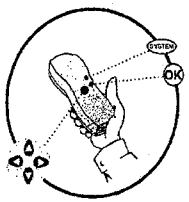
These can be used to connect the following:
- **an A/V receiver or an A/V amplifier with a digital multi-channel sound decoder**
- **a receiver with two-channel digital stereo (PCM)**

Digital multi-channel sound ?
Digital multi-channel sound offers the best possible sound quality. You will need a multi-channel A/V receiver or amplifier that supports at least one of the audio formats of the DVD recorder (MPEG2, Dolby Digital and DTS). Consult the operating instructions for your receiver to find out which audio formats it supports.

× All I can hear from my loudspeakers is a loud distorted noise
✓ The receiver is not compatible with the digital audio format of the DVD recorder. The audio format of the DVD disc is displayed in the status window when you switch to another language. Playback in six-channel digital surround sound is only possible if the receiver has a digital multi-channel sound decoder.

3 Installing your DVD recorder

Initial installation



After successfully connecting your DVD recorder to the TV set and other additional devices as described in the previous chapter, this chapter will show you how to start the initial installation. The DVD recorder automatically seeks out and stores all available TV channels.

Aim correctly with the remote control

In the following sections, you will need the remote control for the first time. Aim the remote control at the DVD recorder and not at the TV set.

Connecting additional devices

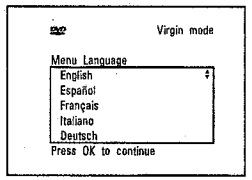
If you have connected additional devices such as a satellite receiver to the aerial cable, switch them on. The automatic channel search will recognise it and save it.

No aerial connected

Even if you only want to use the DVD recorder to play back or have only connected a satellite receiver, you must still complete the initial installation. This is necessary so that the basic settings are stored correctly. Once initial installation is complete you can use the DVD recorder as normal.

Tip

ENGLISH



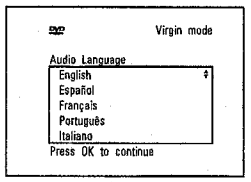
1. Select the desired language for the on-screen menu by pressing ▼ or ▲.

What is an on-screen menu?

The multi-language on-screen menu takes the mystery out of using your new DVD recorder. All settings and/or functions are displayed on your TV screen in the relevant language.

?

2. Confirm with **OK**.



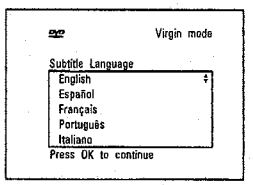
3. Select the desired audio language using ▼ or ▲.

What is an audio language?

The DVD will play the sound in the language you select, provided this language is available on the disc. If it is not available on the disc the fist language on the DVD will be used instead. The DVD Video Disc menu, if available, will also be displayed in the language you select.

?

4. Confirm with **OK**.



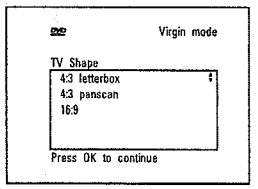
5. Select the desired language for the subtitles by pressing ▼ or ▲.

What is the subtitle language?

The subtitles will be displayed in the language you select, provided this language is available on the disc. If it is not available on the disc the fist language on the DVD will be used instead.

?

6. Confirm with **OK**.



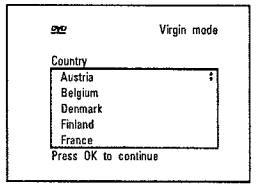
7. Select the desired screen format position using ▼ or ▲. These settings will only be used if you insert a DVD that contains this information.

Which screen formats can I select?

'4:3 letterbox'	for wide-screen (cinema format) with black borders at the top and bottom of the screen.
4:3 panscan'	for a full-height picture with cropped edges.
16:9'	for a wide-screen TV set (screen edge ratio 16:9)

?

8. Confirm with **OK**.



9. Select your country with ▼ or ▲.
If your country does not appear, select *'Other'*.

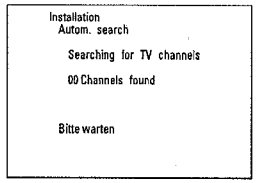
Why do I have to set the country?

To call up the specific settings for the respective country, you must first install the country.

?

10. Confirm with **OK**.

11. After you connect the aerial (or cable TV, satellite receiver, etc.) to the DVD recorder, press **OK**.
The automatic TV channel search starts. 'WAIT' will appear on the display.



× The DVD recorder cannot find any TV stations

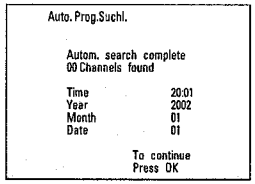
✓ Select channel 1 on the TV set. Can you see the stored TV channel on the TV set?
If not, check the cable connection from the aerial (aerial socket) to the DVD recorder and to the TV set.

✓ Please have patience.
The DVD recorder searches the entire frequency range in order to find and store the largest possible number of TV channels. It is possible that the TV channels in your country are broadcast in a higher frequency range. As soon as this range is reached during the search, the DVD recorder will find the TV channels.

✓ If no aerial is connected, complete the basic settings and then, if desired, start the automatic channel search (see section 'Automatic TV channel search').

Problem

12. When the automatic TV channel search is complete, ***'Autom. search complete'*** will appear on the TV screen.
'Time', ***'Year'***, ***'Month'***, ***'Date'*** will appear on the TV screen.



13. Check if the time in '***Time***' is correct.
14. If required, change the time with the number buttons **0..9** on your remote control.
15. Select the next line with ▲ or ▼ .
16. Check if the displayed settings for: '***Year***', '***Month***' and '***Date***' are correct.
17. When all information is correct, save by pressing **OK** .

The initial installation is now complete.

Satellite receiver

If you are connecting a satellite receiver, please read the section on 'Using a satellite receiver'.

Decoder

If you are connecting a decoder, you must install it as described in the next section.

Tip

×Sound may be distorted on some TV channels.

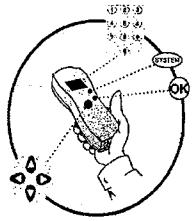
✓ If the sound is distorted on any of the stored TV channels or if there is no sound at all, the wrong TV system may have been stored for the TV channel. Read 'Manual TV channel search' for information on how to change the TV system.

Problem

Using a satellite receiver

TV channels from a satellite receiver (connected to scart socket **EXT 2 AUX I/O**) are received on the DVD recorder on programme number '***EXT2***'

If necessary, use the **MONITOR** button to switch to the internal tuner.
Then select programme number '***EXT1***' with **0** on the remote control and programme number '***EXT2***' with **CHANNEL −** .
You should select the TV channels to be received by the satellite receiver directly on the receiver itself.



Allocating a decoder

Some TV channels send coded TV signals that can only be viewed properly with a purchased or rented decoder. You can connect such a decoder (descrambler) to your DVD recorder. The following function automatically activates the connected decoder for the TV channel you want to watch.

How do I allocate the decoder for Easy Link?

If your TC=V set supports 'Easy Link' the decoder must be assigned to the relevant TV channel on the TV set (see the operating instructions for your TV set). Settings cannot then be made in this menu.

?

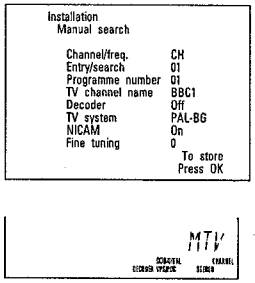
1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON** .
3. Use the **CHANNEL +** and **CHANNEL −** buttons on the DVD recorder or the number buttons **0..9** on the remote control to select the TV channel for which you want to use the decoder. If necessary, use the **MONITOR** button to switch to the internal tuner.
4. Press the **SYSTEM-MENU** button on the remote control. The menu bar will appear at the top of the screen.
5. Select 'T/A' using ◄ or ► .
6. Select line '***Installation***' using ▼ or ▲ and confirm with ► .
7. Select line '***Manual search***' using ▼ or ▲ and confirm with ► .
8. Select line '***Decoder***' using ▼ or ▲ .
9. Select function '***On***' with ◄ or ► .

How can I switch the decoder off again?

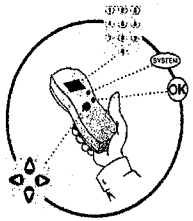
Select '***Off***' (decoder off) on the TV screen in the line '***Decoder***' using ► .

?

10. Confirm with **OK** .
11. To end, press **SYSTEM-MENU** .



Your decoder has now been allocated to this TV channel.
When this TV channel is selected, the 'DECODER' symbol will appear in the DVD recorder display.



Manual TV channel search

ENGLISH

In some cases, not all of the available TV channels may have been found and stored during initial installation. In this case, you will need to search for and store the missing or coded TV channels manually.

Manual search with EasyLink

With 'Easy Link', the DVD recorder will automatically download the TV channels stored on the TV set. This is why some lines have no function. To store new TV channels, they must first be stored on the TV set. The information will then be transferred to the DVD recorder automatically.

Tip

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON**.
3. Press **SYSTEM-MENU** on the remote control. The menu bar appears.
4. Select '⚙' using ◀ or ▶.
5. Select '***Installation***' using ▼ or ▲ and confirm with ▶.
6. Select '***Manual search***' using ▼ or ▲ and confirm with ▶.

Installation
Manual search

Channel/freq.	CH
Entry/search	01
Programme number	01
TV channel name	BBC1
Decoder	Off
TV system	PAL-BG
NICAM	On
Fine tuning	0
	To store
	Press OK

7. In '***Channel/freq.***', select the desired display using ▶

What is hidden behind the settings?

'***Freq.***': Display/entry of frequencies
'***CH***': Display/entry of channels
'***S-CH***': Display/entry of special channels

What is a special channel?

TV signals are transmitted in certain pre-defined frequency ranges. These ranges are divided into channels. A specific frequency/channel is assigned to each TV station. Certain frequency ranges are specified as special channels (hyperband channels).

?

8. In '***Entry/search***', enter the frequency or channel of the TV station using the number buttons **0..9**.

***I don't know the channel for my TV station**

✓ In this case, press ▶ to start the automatic search. A changing channel number/frequency number will appear on the TV screen. Continue the automatic search until you have found the TV channel you are looking for.

Problem

9. Using ◀ or ▶ in '***Programme number***', select the programme number you want to use for the TV channel, e.g. '***01***'.

How can I change the displayed symbol of a TV channel?

1. In '***TV channel name***', press ▶.
2. Select the desired symbol position using ◀ or ▶.
3. Change the symbol at the symbol position with ▼ or ▲.
4. Select the next symbol position in the same way.
5. Keep pressing ▶ until the cursor disappears.

Tip

How can I change the TV system of the TV channel?

In '***TV system***', use ◀ or ▶ to select the TV system that produces the least distortion of picture and sound.

What is NICAM?

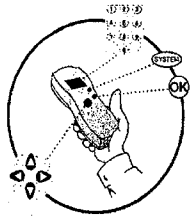
NICAM is a digital sound transmission system. Using NICAM, you can transmit either 1 stereo channel or 2 separate mono channels. However, if reception is poor and the sound distorted you can turn off NICAM.
In '***NICAM***', select '***Off***' using ◀ or ▶.

How can I improve the automatic process for storing channels?

To change the automatic process for storing channels (fine tuning), select '***Fine tuning***'.
Using ◀ or ▶ you can try to fine-tune the TV channel manually.

Experts

10. Press **OK** to store the TV channel.
11. To search for other TV channels, begin again at 8.
12. To end, press **SYSTEM-MENU**.



Sorting TV channels automatically (Follow TV)

When the automatic channel search function is activated, the TV channels are stored in a specific order. This may differ from the order in which the TV channels appear on your TV set.
This function changes the order of the TV channels stored in your DVD recorder to match the order on the TV set.
This only works if the DVD recorder (**EXT 1 TO TV-I/O** socket) and the TV set are **connected with a scart cable.**

What does EASYLINK do?

If your TV set supports 'Easylink,..', TV channels will be stored during initial installation in the same order as they appear on the TV set. To store the TV channels in a different order, you'll need to change the order on the TV set. When you start the Follow TV function the information is transferred again from the TV set.

?

1. Switch on the TV set. If required, select the programme number for the DVD recorder.

2. Switch on the DVD recorder using **STANDBY/ON**.
3. Press the **SYSTEM-MENU** button on the remote control. The menu bar appears.
4. Select 'TA' using ◄ or ►.
5. Select '***Installation***' using ▼ or ▲ and confirm with ►.
6. Select '***Follow TV***' using ▼ or ▲ and confirm with ►.
7. Confirm the message on the screen with **OK**. 'TV 01' will appear in the DVD recorder display.

TV 01

8. Select programme number '1' **on the TV set.**

Problem

×I cannot switch my TV set to programme number '1'
✓ If you have connected additional devices to the **EXT 2 AUX I/O** socket, please disconnect these devices. Other connected devices may have switched the TV set to the programme number of the scart socket.

9. Confirm with **OK** on the DVD recorder remote control.
'WAIT' will appear on the display. The DVD recorder compares the TV channels on the TV set and the DVD recorder.
If the DVD recorder finds the same TV channel as on the TV set it stores it at 'P01'.

Problem

×"NOTV" will appear in the display. The DVD recorder is not receiving a video signal from the TV set.
✓ Check the connectors at both ends of the scart cable.
✓ Check your TV's operating instructions to see which scart socket is used for video signals.
✓ If the problem persists, you won't be able to use this feature. Please read 'Sorting and clearing TV channels manually'.

10. Wait until for example 'TV 02" appears in the display.

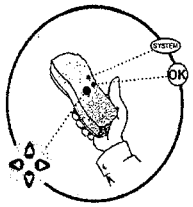
TV 02

11. Select the next programme number **on the TV set**, e.g. '2'.
12. Confirm with **OK** on the DVD recorder remote control.

Tip

Deleting sorting
You can delete incorrect TV channel sorting by pressing ◄.

13. Repeat steps 10 to 12 until you have assigned all the TV channels.
14. To end, press **SYSTEM-MENU**.



Automatic TV channel search

During installation, all available TV channels are searched for and stored. If the channel assignments of your cable or satellite TV provider change or if you are reinstalling the DVD recorder, e.g. after moving house, you can start this procedure again. This will replace the stored TV channels with the new ones.

What does Easy Link do?
With Easylink, you can search for and store TV channels only on the TV set. These settings are accepted by the DVD recorder. Use this function to start the transfer of TV channels from the TV set.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON**.
3. Press **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.
4. Select 'TA' using ◄ or ►.
5. Select line '***Installation***' using ▼ or ▲ and confirm with ►.
6. Select line '***Autom. search***' using ▼ or ▲.
7. Press ►.

Installation
Autom. search

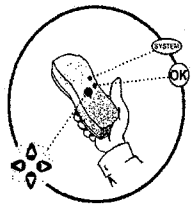
Searching for TV channels

00 Channels found

Bitte warten

8. The automatic TV channel search starts. This allows the DVD recorder to save all available TV channels. This procedure may take several minutes.
9. When the automatic search is completed, '***Autom. search complete***' will appear on the TV screen.
10. To end, press **SYSTEM-MENU**.

You can read about how to search for a TV channel manually in section 'Adding and clearing TV channels manually'.



Sorting and clearing TV channels manually

ENGLISH

After you have performed the automatic channel search you may not agree with the sequence in which the individual TV channels have been allocated to the programme positions (programme numbers). You can use this function to rearrange the TV channels already stored or to delete TV channels you don't want or those with poor reception.

The teletext clock resets automatically

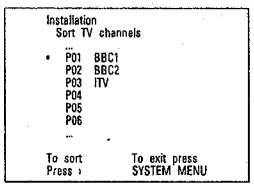
If you store a TV channel which transmits TXT/PDC on programme number 'P01', the date and time will automatically be transmitted and constantly updated. As a result, the changes from summer time to winter time and back again will be made automatically.

Tip

What does Easy Link do?

With Easylink, TV channels can only be searched for and saved on the TV set. These settings are then accepted by the DVD recorder.
That is why you cannot select this function manually.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Turn on the DVD recorder. Press the **SYSTEM-MENU** button on the remote control. The menu bar will appear at the top of the screen.
3. Select '⚙' using ◄ or ►.
4. Select line '***Installation***' using ▼ or ▲ and confirm with ►.
5. Select line '***Sort TV channels***' using ▼ or ▲ and confirm with ►.



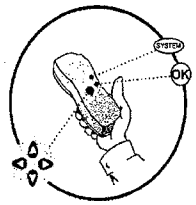
6. Select the TV channel that you want to delete or whose order you want to change using ▼ or ▲.
7. Confirm with ►.

Deleting TV channels

Unwanted channels or those with poor reception can be deleted using **CLEAR**. After that you can continue at step 6.

Tip

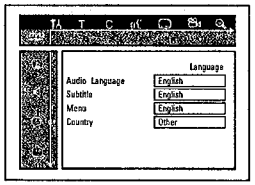
8. Using ▼ or ▲, shift the TV channel to the desired position and press the ◄ button. The DVD recorder will insert the TV channel.
9. Repeat steps 6 to 8 until you have resorted/deleted all desired TV channels.
10. To save, press **OK**.
11. To end, press **SYSTEM-MENU**.



Setting the language/country

You can select the country and the subtitle language as well as the audio language for DVD playback. Please observe that with some DVDs, you can change the audio language and/or subtitle language only via the DVD disc menu.
Moreover, you can set one of the displayed languages for the on-screen menu (OSD). However, the DVD recorder display will only display English text regardless of this setting.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON**.
3. Press **SYSTEM-MENU** on the remote control. The menu bar appears.
4. Select the '⚙' icon using ◄ or ►.
5. Select '***Language***' using ▼ or ▲ and confirm with ►.



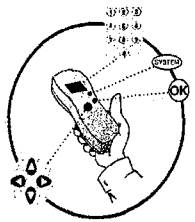
6. Select the appropriate line and confirm with ►.

Which settings can I choose?

Audio Language: Playback language (audio language)
Subtitle: Subtitle language
Menu: Language of the OSD menu
Country: Location (country)

Tip

7. Select the appropriate setting using ▼ or ▲ and confirm with **OK**.
8. To end, press **SYSTEM-MENU**.



Setting the time and date

If the display shows an incorrect time or '--:--', the time and date must be reset manually.
If a TV channel which transmits TXT/PDC (teletext/PDC) is stored under programme number 'P01', the time and date will automatically be taken from the TXT/PDC information.

ENGLISH

1. Press **SYSTEM-MENU** on the remote control. The menu bar appears.
2. Select the 'T' icon using ◀ or ▶ .
3. Select '*Installation*' using ▼ or ▲ and confirm with ▶ .
4. Select '*Time/Date*' using ▼ or ▲ and confirm with ▶ .

Installation
Time/Date

Time	20:00
Year	2002
Month	01
Date	01

To exit press
SYSTEM MENU

5. Check if the time in '*Time*' is correct. If required, change the time with the number buttons **0..9** on your remote control.
6. Check '*Year*', '*Month*' and '*Date*' in the same way. To move between the fields, use ▼ or ▲ .
7. Check the displayed settings and confirm with **OK** .
   '*Stored*' will appear briefly on the screen.
8. To end, press **SYSTEM-MENU** .

4 Information on the TV screen

You can check and change many of the features and settings on your DVD recorder using the system menu. The menu bar cannot be displayed during recording.

Icons in the menu bar

Use the **SYSTEM-MENU** button to call up and close the menu bar (main menu). You can select the appropriate feature using ◀ and ▶ . You confirm a feature using ▼ . This takes you to a submenu or executes the feature immediately.
Depending on the current disc, some features may not be available.

Menu bar 1

	User preferences
T	Title/Track
C	Chapter/Index
	Audio language
	Subtitle language
	Camera angle
	Zoom

Menu bar 2

To display menu bar 2, press ▶ while menu bar 1 is displayed.

	Sound
	Frame-by-frame playback
	Slow motion
▶▶	Fast motion
	Search by time

Temporary feedback icons

Temporary feedback icons appear in the top left hand corner of the menu bar with information on the different operating modes. This information appears briefly when certain disc features are activated :

	Shuffle: Shuffle play
	Scan
	Repeat entire disc
	Repeat title
	Repeat track
	Repeat chapter
	Repeat from A to end
	Repeat from A to B
	Camera angle
	Child lock active
	Auto resume
	Action not allowed

Status box

The status box displays the current operating mode (status) of the DVD recorder and the current disc type. This display can be switched off.

Disc type icons

	DVD+RW
	DVD+R
	DVD video
	Video CD
	No disc
	Error

Operating mode icons

	Record
	Stop
	Play
	Pause play
	Record pause
	Search forwards (8x speed)
	Search backwards (8x speed)
	Slow motion

Tuner info box

This box appears in the lower left-hand corner of the screen. The aerial signal, the TV channel and name of the TV channel are shown.

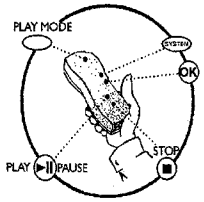
	Current channel/selected input socket
	No signal TV channel is not available/additional device is not connected or is switched off
	Copy-protected signal

Timer information box

This box appears above the tuner information box. When a timer recording is set, it shows the timer icon and the start time or date of the first programme to be recorded.
If no timer recording is scheduled, the current time is displayed.
This box disappears during playback of a disc or after a recording starts.

	Timer starts on the day shown
	OTR recording runs until the stop time displayed
	Current time No timer event programmed

5 Playback



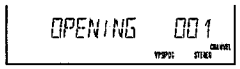
Playback hints

This DVD recorder will play the following systems:
- DVD video
- (Super)Video-CD disc
- DVD+RW disc
- DVD+R Disc
- DVD-RW (videomode, finalised)
- DVD-R
- CD-R
- CD-RW
- Audio CD
- MP3-CD

You can operate the DVD recorder using the remote control or the buttons on the front of the DVD recorder.

ENGLISH

Inserting a disc



1. Press the **OPEN/CLOSE** button on the front. The disc tray opens. The dialog box shows *'OPENING'* and then *'TRAY OPEN'*.
2. Insert the disc carefully into the tray, with the label uppermost and press **PLAY/PAUSE ►II** or **OPEN/CLOSE**. The dialog box shows *'CLOSING'* and then *'READING'*. The information on the disc is read.

How do I insert a double-sided DVD?

Double-sided discs are not printed on either side. The labelling is in the centre on each side of the disc. The labelling of the side you wish to play must be uppermost.

Opening/closing the tray using the remote control

You can open and close the disc tray using the remote control.
Press and hold the **STOP ■** button on the remote control until the dialog box shows *'OPENING'* or *'CLOSING'*.

Tip

3. Playback begins automatically.

DVD VIDEO DVD

A menu may appear during playback of a DVD. In case titles and chapters are numbered, press a number button on the remote control. You can also select a menu item using ◄, ►, ▲, ▼ and confirm with **OK**.
For further information, read chapter 'Playing a DVD video disc'.

RW DVD+ReWritable

During the playback of a DVD+RW, the index screen overview appears. Choose the title you want to play back using ▼, ▲, ⏮, ⏭.
Confirm with **OK**.
For further information, read chapter 'Playing a DVD+RW/+R disc'.

COMPACT DISC DIGITAL AUDIO

If the playback does not start automatically, press **PLAY/PAUSE ►II**.
For further information, read chapter 'Playing an audio CD'.

COMPACT DISC DIGITAL VIDEO

If the '■' symbol appears in the display, start playback by pressing **PLAY/PAUSE ►II**. If a menu appears on the screen, use the remote control buttons indicated on the screen to select the menu option you want (PREV= ⏮, NEXT= ⏭) or with the number buttons **0..9**.
For further information see ' Playing a (Super) Video CD'.

Playing a DVD video disc

× 'PIN' will appear on the display

✓ The child lock was activated for the inserted disc. Read section 'Access control' and 'Authorising a disc' and in chapter 'Access control (child lock)'.

× The menu on the screen is showing an 'X'

✓ Some DVD discs can be manufactured so that certain steps are required before the disc can be played, or so that only limited operation is possible during playback. When an 'X' appears on the screen the selected feature is not possible.

× The screen is showing regional code information

✓ Since DVD films are not normally released in all parts of the world at the same time, all DVD players have a specific regional code. Discs can be given a regional code. If the regional codes differ between the player and the disc, playback is not possible.

✓ The regional code is shown on the label on the back of the machine.

✓ The regional code does not apply to recordable DVD discs.

× The screen is prompting me to choose an option from the menu.

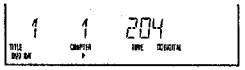
✓ Select the option you want using ▲, ▼, ◄, ► or the number keys **0..9**.
In some cases you need to confirm with **OK**.
You can also access the menu using **DISC-MENU** on the remote control.

Problem

How can I access hidden information?

1. Press the **DISC-MENU** button on the remote control. A menu will appear on the screen. For some feature films this may appear after an introductory sequence.
2. Select the option you want using ▲, ▼, ◄, ► or the number keys **0..9**.
Confirm with **OK**.

Tip



1. If playback does not start automatically, press **PLAY/PAUSE ►II** .
   The display shows:
   title, chapter, time elapsed.
2. To stop the disc, press **STOP ■** on the remote control or **■STOP** on the DVD recorder.
3. To eject the disc, press **OPEN/CLOSE** on the front of the DVD recorder.

Playing a DVD+RW/+R disc

1. If the disc is write-protected or a finalised DVD+R disc, playback starts automatically.

2. If playback does not start automatically, select the title you want to watch from the Index Picture Screen using ▼ or ▲ .
   You can also use the ⏮ or ⏭ buttons on the front of the set.
3. Press **PLAY/PAUSE ►II** .
   The display shows:
   title number, recording quality.

×I see the message 'EMPTY' in the display
✓ There are no recordings on this disc.

Problem

4. To stop the disc, press **STOP ■** on the remote control or **■STOP** on the DVD recorder.
5. To eject the disc, press **OPEN/CLOSE** on the front of the DVD recorder.

What should I note when playing back different recording types (qualities)?
The correct recording quality '***HQ***(*HQ*), ***SP+***(*SP+*), ***EP***(*EP*), ***EP+***(*EP+*)' will automatically be selected during playback.
For more information, please read section 'Selecting the recording type (Quality)' in chapter 'Manual recording'.

?

Playing an audio CD

You can use your DVD recorder to play audio CDs

1. Insert an audio CD. Playback starts automatically.

Audio CD display'
If the TV is on, the audio CD screen appears automatically
During play, the current track number and its elapsed playing time will show on the TV screen and on the recorder display.

Tip

2. Stop playback using **STOP ■** . The number of tracks and the total time are displayed.

Playing an MP3 CD

MP3 (MPEG1 Audio Layer-3) files are highly compressed music files. Using this technology the data volume can be compressed by a factor of 10. This means it is possible to record 10 hours of music in CD quality on a single CD-ROM.

When creating MP3 CDs please note the following:
Supported file system: ISO9660, Joliet
Supported formats: *.mp3
File names: maximum 64 ASCII characters (Joliet)
Maximum of 99 albums, 999 tracks
Supported sampling frequencies: 44.1kHz, 48kHz. Files with lesser than 44.1kHZ will be skipped.
Supported bit rate: 32, 64, 96, 128, 192, 256 (kbps)
ID3 Tag: Version 1, 1.1. If the version is higher, the directory name is used for the album and the filename for the track.

Important notes for playback:
In agreement with SDMI the digital audio output will not work during MP3 playback.
Only the first session of a multi-session CD will play back.

1. Insert an MP3 CD. Playback starts automatically.

MP3 CD display
If the TV is on, the MP3 CD screen appears automatically
During playback, the current track number and its elapsed playing time will show on the TV screen and on the recorder display.
During interrupted playback (**STOP ■**), the current track number will show on the TV screen and on the recorder display.
If available in the so-called ID tag, more information will be displayed on: album, track, and artist.

Tip

2. Stop playback using **STOP ■** . The number of albums will be shown in the display.

Additional playback features

Select the previous or next title with ⏮ or ⏭ .

Choose the previous or the next album using ▲ or ▼ .
Choose the previous or next title with ◀ or ▶ .
You can also use the number buttons **0..9** on the remote control to enter the number of the album/track.

You can also use **T/C** to select titles and albums.

1. Press **T/C** and then select symbol 'T' for album or 'C' for title with ▶ or ◀ .
2. Select the number of the album/title with ▼ , ▲ or with the number buttons **0..9** on the remote control.

You can also use repeat functions (Button **PLAY MODE**).

Tip

ENGLISH

Playing a (Super) Video CD

(Super) Video CDs may be equipped with PBC (Play Back Control). This means that special playback functions (menus) can be directly selected. The Video CD must be PBC-compatible (see CD packaging).
'PBC' is turned on by default.

1. Insert a (Super) Video CD and press **PLAY/PAUSE ▶II** .
   If the '■' symbol appears in the display, start playback by pressing **PLAY/PAUSE ▶II** .
2. If a menu appears on the screen, use the remote control buttons indicated on the screen to select the menu option you want (PREV= ⏮ , NEXT= ⏭) or with the number buttons **0..9** .
   If the PBC menu contains a title list, the desired title can be chosen directly.
3. The **RETURN** button will take you back to the previous menu.
4. Stop playback using **STOP ■** .

6 Additional playback features

Changing to another title/chapter

If there is more than one title or chapter on the disc, follow the instructions to change to another title or chapter. If there are several chapters within the title, these will be shown. It is possible to select these titles using the menu bar.

1. During playback use the ⏭ button to move to the next title/chapter. Pressing ⏮ takes you to the start of the current title or chapter. Pressing ⏮ twice takes you to the start of the previous title or chapter.

Using T/C (title/chapter)

1. Press **T/C** (title/chapter) and select the appropriate title using ▲ or ▼ .
   Ensure that the 'T'(Title) icon is selected in the menu bar.
2. Using **T/C** you can select chapters within the title. Press **T/C** and select the 'C' (Chapter) icon using ▶ .
   Select the appropriate chapter using ▲ or ▼ .

Tip

Searching a disc

You can search the disc for a recording at 4x or 32x playback speed. Additional playback speeds are available via menu bar (▶▶).

1. During playback, press and hold ⏮ (reverse) or ⏭ (forwards) to switch to the search feature. You can switch between the playback speeds using ⏮ / ⏭ .
2. To continue playback press **PLAY/PAUSE ▶II** twice at your chosen location.

× No sound
✓ The sound is switched off in search mode. This is not a fault in your machine.

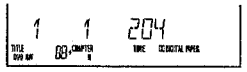
Problem

Search function via menu bar

1. During playback press **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.
2. Select the '▶▶' icon using ▶ or ◀ and confirm with ▼ .
3. Using ◀ or ▶ you can now select different speeds forwards or backwards.
4. If necessary hide the menu bar using **SYSTEM-MENU** .
5. To continue playback, press **PLAY/PAUSE ▶II** .

Tip

Still picture



1. During playback, press **PLAY/PAUSE ►II** to stop the disc and display a still picture.

Frame-by-frame playback via menu bar

1. During the still picture press **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.
2. Select the '[]' icon using ► or ◄ and confirm with ▼ button.
3. Using ◄ or ► you can now scroll back or forwards one frame at a time.
4. If necessary hide the menu bar using **SYSTEM-MENU**.
5. To continue playback, press **PLAY/PAUSE ►II**.

Tip

Slow motion

1. During playback, press **PLAY/PAUSE ►II** on the remote control. Then hold down **I◄◄** or **►►I** to switch to slow motion.
2. You can choose between the various speeds using **I◄◄** or **►►I**.

Slow motion over the menu bar

1. During playback, press **PLAY/PAUSE ►II** on the remote control and then press **SYSTEM-MENU** The menu bar will appear at the top of the screen.
2. Select the '▷' symbol using ► or ◄ and confirm with ▼.
3. Using ◄ or ► you can now select various slow motion speeds backwards or forwards.
4. If necessary hide the menu bar using **SYSTEM-MENU**.

Tip

3. To continue playback, press **PLAY/PAUSE ►II** twice.

Search by time

Using this feature you can select where playback should start (select elapsed time).

1. During playback press **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.
2. Select the '⏱' symbol using ► or ◄ and confirm with ▼. Playback is stopped and a box appears on the screen showing the elapsed time.
3. Enter the start time with the digit keys **0..9** from where playback should start.

4. Confirm with **OK**.

× The time entered will flash
✓ The selected title is shorter than the time entered. Enter a new time or end the function using **SYSTEM-MENU**.

Problem

5. Playback starts before the time entered.

Repeat/Shuffle play

You can mark entire sections or the whole disc for endless playback. Depending on the type of disc (DVD video, DVD+RW, video CD) you can select a chapter, title or the entire disc.

1. Select the desired chapter, title or the entire disc and start playback.
2. During playback, press **PLAY MODE**. By pressing **PLAY MODE** again you can chose from the following options:
   - '↻ chapter': repeat chapter – DVD only
   - '↻ title': repeat title/track
   - '↻ repeat': repeat entire disc (Video CD, Audio CD only)
   - '↻ shuffle': Shuffle play
   - display disappears: no repeat
3. To switch off the repeat, press **STOP ■**. You can also press **PLAY MODE** repeatedly until the icons disappear.

Repeat sequence (A-B)

You can repeat a certain sequence within a title/chapter. You have to mark the start and end of the desired sequence.

1. During playback press at the start of the sequence **PLAY/PAUSE ►II**. You see a still picture.
2. Press **PLAY MODE** until the '↻ A-' icon appears on the screen. This marks the start point. Press **PLAY/PAUSE ►II** to start playback.
3. At the desired end point, press **OK**. '↻ A-B' appears on the TV screen. The disc will only play between the selected points.
4. To switch off the repeat, press **STOP ■**. You can also press **PLAY MODE** repeatedly until the icons disappear.

Scan feature

This feature plays back the first 10 seconds of each chapter (DVD) or track (CD).

1. During playback, press **PLAY MODE**. Select '--' using **PLAY MODE**.
2. After 10 seconds the DVD recorder switches to the next chapter/index. To start playback at the corresponding chapter/index, press **STOP ■** and then **PLAY/PAUSE ►II**.

Zoom feature

The Zoom feature allows you to enlarge the video image and pan through the enlarged image.

1. During playback, press **PLAY/PAUSE ►II**. The DVD recorder switches to 'PAUSE'. You will see a still picture.
2. Press **SYSTEM-MENU** and select the '🔍' icon using ►.
3. Select the required zoom factor using ▼ or ▲.
4. When ***'press OK to pan'*** appears on the screen, the zoom process is complete.
5. Press **OK**. Using ▲, ▼, ►, ◄ select the part of the image you wish to view.
6. Confirm with **OK**.
7. To stop the feature, press **PLAY/PAUSE ►II** and then **SYSTEM-MENU**.

Camera angle

If a DVD video contains sequences recorded from different camera angles you can change the camera angle for playback.

1. During playback, press **PLAY/PAUSE ►II**. You will see a still picture.
2. Press **SYSTEM-MENU** and select the '📷' icon using ►.

Problem

× **The '📷' icon is not visible**

✓ The selected scene was not recorded from different camera angles. That is why you cannot select this feature. For more information please read the 'cover text' on your DVD video disc.

3. Select the required camera angle using ▼ or ▲. You can also enter the number directly using the number buttons **0..9**.
4. After a short delay, playback changes to the new camera angle. The '📷' icon remains displayed until multiple angles are no longer available.

Changing the audio language

Pre-recorded DVD videos often come with multiple audio languages. Playback uses the language you selected during initial installation. You can change the audio language of the current disc at any time.
You can change the audio language either using the menu of the inserted disc (**DISC-MENU** button) or the menu bar (**SYSTEM-MENU** button). The audio languages for DVD playback in the two menus may be different.

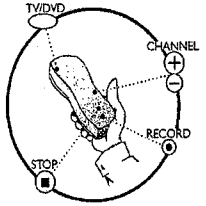
1. During playback press **SYSTEM-MENU** and select the '🔊' icon using ►.
2. Select the required audio language using ▼ or ▲. You can also enter the number directly using the number buttons **0..9**.
3. Play continues in the new audio language.

Subtitles

Pre-recorded DVD videos often come with subtitles in several languages. Playback uses the language you selected during initial installation. You can change the subtitle language of the current disc at any time.
You can change the subtitle language either using the menu of the inserted disc (**DISC-MENU** button) or the menu bar (**SYSTEM-MENU** button). The subtitle languages in the menus may differ.

1. During playback press **SYSTEM-MENU** and select the '💬' icon using ►.
2. Select the required subtitle language using ▼ or ▲. You can also enter the number directly using the number buttons **0..9**.
   You can switch off subtitles again with **0** or by pressing ***'off'***.
3. Playback continues in the new subtitle language.

7 Manual recording



General information

Which discs can I use for recording?

With this DVD recorder, you can record on two types of DVD:

DVD+RW

This disc can be written to and then the contents deleted.

DVD+R

This type of disc can only be recorded once.

If you want to play this DVD in a DVD player it must be finalized using the ***'Finalise disc'*** function. It is not possible to make further recordings using this disc.

If this disc is to be played in a DVD recorder it must not be finalised. Recordings can be added and deleted. The disc space (playback time) from the deleted recording cannot be recovered for further recordings

ENGLISH

Use the 'Manual recording' feature to spontaneously start recording (e.g. to record a TV show already in progress).

In the 'Index Picture screen' select the title to be overwritten or ***'Empty title'*** using ▼ and ▲ .

If you want to record between existing recordings, check the length of the old recording and the length of the new recording. If the new recording is too long, the following recording (title/chapter) will be overwritten.

Insert new recordings at the end of all existing recordings (Safe Record)

To add a new recording at the end of the last recording on the disc, hold down the **REC/OTR ●** button until the message 'SAFE REC0' appears on the display.

For DVD+R discs each new recording is always added at the end of all previous recordings as existing recordings cannot be overwritten.

Tip

If you want to start and stop a recording manually, read **'Recording without automatic switch-off'.**

If you want to start a recording manually but stop it automatically, read **'Recording with automatic switch-off'** (e.g. not to record to the end of the disc).

Read **'Automatic recording from a satellite receiver'**, if you want a recording to be controlled automatically by a satellite receiver.

Read **'Direct record'** if you want to record a programme currently being shown.

Recording without automatic switch-off

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Insert a disc to be used for the recording. The system and content of the disc will be checked. 'READING' will appear on the display.

× Index display

✓ A DVD+RW disc was inserted that already contains recordings. Use ▲ and ▼ to select a location where the recording should be started.

× 'EMPTY DISC' appears in the display

✓ The inserted DVD disc is empty.

× A dialog box appears asking if the contents should be erased or the disc should be ejected

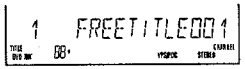
✓ The inserted disc is a DVD+RW disc whose contents are not compatible with DVD Video (e.g. a data disc). This disc cannot be used for recordings until the entire disc is erased using the **REC/OTR ●** button.

× *'Too many titles'* appears on the screen when a recording is attempted

✓ A disc can only contain a max. of 48 titles (including the empty titles). Erase the titles or change the disc.

Problem

3. If necessary, switch to the internal tuner on the DVD recorder using the **MONITOR** button on the remote control.
4. Select the programme number (station name) you wish to record using **CHANNEL +** or **CHANNEL −** . The following will appear on the display:



Station name

If a TV station transmits a station name it will be shown in the display.

Programme number of the external inputs:

'EXT1' Scart socket at the back **EXT 1 TO TV-I/O**

'EXT2' Scart socket at the back **EXT 2 AUX I/O**

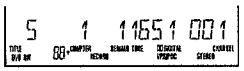
'CAM1' SVHS-/Audio front sockets **S-VIDEO / left AUDIO right**

'CAM1' Video/audio front sockets A/V **VIDEO / left AUDIO right**

Switching between sockets **S-VIDEO** and **VIDEO** is done automatically. In case both sockets are used, the signal received at socket **S-VIDEO** is treated with priority.

'CAM2' Digital Video (i Link) front socket **DV**

Tip



5 To start recording, press **REC/OTR ●** on the remote control or **RECORD** on the DVD recorder. If you want to start the recording at the end of the existing recordings, hold down the **REC/OTR ●** button until the message 'SAFE RECO' appears on the display.
For DVD+R discs each new recording is always added at the end of all previous recordings as existing recordings cannot be overwritten.
On the display will appear e.g.:

Inserting chapter markers

During recording it is possible to mark scenes that you want to see or hide later.
During recording press **EDIT** at the relevant location. The screen displays ***'Inserting marker'***. The 'CHAPTER' number is increased by one in the display box.
For more information on titles and chapters please see the section 'Changing to another title/chapter' in the chapter 'Playback'.

Tip

6 You can stop recording by pressing **STOP ■** on the remote control or **■STOP** on the recorder. 'MENU UPDT' will appear on the display. The DVD player is preparing the list of contents. Wait until this message disappears in the display, then the recording is completed.

✗ The display will read 'DISC ERR'
✓ The recording could not be completed correctly because of a disc error. Check and, if necessary, clean the inserted disc.

Problem

Making recordings on DVD+R discs compatible

If you want to play back the recording on a DVD player, you need to finalise the disc in the DVD recorder. You can prepare your DVD for use in a DVD player using the ***'Finalising'*** feature. See the section 'Finalising DVD+R discs' in chapter 'Managing the disc contents'.

Tip

Interrupt recording (Pause)

1 During recording press **PLAY/PAUSE ►II** , for example to avoid recording the commercials.

2 To continue recording, press **REC/OTR ●** .

End recording

To end the recording, press the **STOP ■** button. Wait until 'MENU UPDT' disappears from the display.

Tip

Recording with automatic switch-off (OTR – One Touch Recording)

1 Insert a disc.

2 Use **CHANNEL +** or **CHANNEL −** to select the programme number (channel name) you want to record.

3 Press **REC/OTR ●** on the remote control.

4 Each time you press **REC/OTR ●** you will add 30 minutes to the recording time.

How can I cancel the recording time I have just set?

To cancel the entry, press the **CLEAR** button while the recording time is displayed.

Protecting the disc against accidental recording

To prevent an important recording from being accidentally erased, you can protect the entire disc. You can only protect the disc as a whole. It is not possible to protect an individual recording.

What happens with DVD+R discs?

As long as these discs are not finalised, they can be protected against accidental erasure in the same way as DVD+RW discs.

1 Insert the disc you wish to protect.

2 Press **DISC-MENU** . The Index Picture Screen appears.

3 While the Index Picture Screen is displayed, press the **STOP ■** button on the remote control. The first title is marked.

4 Press **▲** . This takes you to the disc info screen.

5 Press the **►** button.
Select ***'Protection'***.
Confirm with **►** .

6 Select ***'Protected'*** using **▼** and confirm with **OK** .

7 Quit using **◄** and then **DISC-MENU** .

The entire disc is now protected. If you try to record onto this disc the message 'DISC LOCK' will appear in the display and *'Disc locked'* on the screen.

Lining up recordings within a title (assemble cut)

ENGLISH

You can add further recordings to a title already contained on a DVD+RW disc. This recording will be added to the title as a so-called 'chapter'. Existing information will be overwritten from this location onward. Depending on the length of the recording, this will also overwrite titles that follow the current title. The recording mode (quality) is automatically transferred from the current title.
To play back this recording, press **SYSTEM-MENU** and select 'C' (chapter) using ▶ . You can also use **T/C** .

For more information, read section 'Changing to a different title/chapter' in chapter 'Playback'.

What happens with DVD+R discs?
New recordings on 'DVD+R' discs can only be added after existing recordings. It is not possible to overwrite existing recordings on 'DVD+R' discs.

1. Find the title in the Index Picture Screen where you want to insert the new recording.
2. Look at the last minute of the old recording (playback)
3. Press **PLAY/PAUSE ▶II** on the remote control at the position where the new recording is to go. 'II ' will appear on the display.
4. To monitor the recording you can switch to the internal tuner using **MONITOR** .
5. Now start recording as usual by pressing **REC/OTR ●** on the remote control.
   The new recording will be inserted.
6. Stop recording with **STOP ■** .

Selecting the recording mode (quality)

By selecting a recording mode, you define the picture quality of recordings and the maximum recording time for a disc.
You can check the quality by switching to a recording mode and then watch the picture via the built-in tuner (**MONITOR** button).
For playback, the correct picture quality will automatically be selected.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. On the front of the DVD recorder select the recording quality using **REC MODE** .
   You can also use the button **REC. MODE** on the remote control.

Which recording types can I choose?
'HQ/HQ': HighQuality offers the best picture quality and a recording time of 60 minutes.
'SP+/SP+': StandardPlay (pre-recorded DVD quality) offers excellent picture quality with a recording time of 150 minutes.
'EP/EP': ExtendedPlay (better than VHS quality). Recording time 240 minutes.
'EP+/EP+': 6 hours (VHS picture quality). Recording time 360 minutes.

Can I select the recording type via a menu as well?
1. Press the **SYSTEM-MENU** button.
2. Select 'T/A' symbol with ◀ or ▶ .
3. Select *'Record settings'* using ◀ or ▶ and confirm with ▶ .
4. In the line *'Rec Mode'* select the recording type with ▼ or ▲ .
5. Confirm using **OK** and **SYSTEM-MENU** .
6. If you have selected the recording type *'EP/EP'* or *'EP+/EP+'*, you can select the settings *'Stndrd'* (Standard) or *'Sport'* (fast movements) in the *'Filter mode'* line.

Tip

Automatic recording from a satellite receiver (Sat Recording)

You can use this feature if you own a satellite receiver that can control other devices via a scart cable and a programming feature (Timer). For more information, please see the operating instructions for the satellite receiver.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **SYSTEM-MENU** on the remote control. The menu bar appears.

3. Select '⚙' using ◀ or ▶ .

4. Select line ***'Record settings'*** using ▼ or ▲ and confirm with ▶ .

5. Select ***'Sat record'*** using ▼ or ▲ .

6. Select ***'EXT2'*** with ◀ or ▶ .

Switching off 'Sat Recording'
To switch off the feature, select ***'Off'*** using ▶ or ◀ .

Tip

ENGLISH

7. Confirm with **OK** .

8. Use a scart cable to connect the scart socket **EXT 2 AUX I/O** on the DVD recorder to the corresponding scart socket on the satellite receiver.

9. Quit using **SYSTEM-MENU** .

10. Insert a disc that you want to use for recording.

11. Programme the satellite receiver with the required information (programme number of the TV channel, start time, end time).
If necessary, please see the operating instructions for your satellite receiver.

12. Switch off the DVD recorder with **STANDBY** ⏻ . '⚠' appears in the display to show the activated feature.

The DVD recorder is now ready to record. The beginning and end of the recording is controlled via the scart socket **EXT 2 AUX I/O** .

'Direct Record'

Can I instantly record the TV channel I want, even though the DVD recorder is switched off? No problem. If recording is started manually, the DVD recorder, when it is **switched off** , is set to the current TV channel on the TV set using the scart cable.
You will find more information on how to switch 'Direct record' on or off in the next section 'Direct Record'.

How does Direct Record work?
The DVD recorder uses the scart cable to compare the TV channel selected on the TV set with its stored TV channels. If the same TV channel is found, the DVD recorder switches to the corresponding programme number and starts recording.
During this search please do not change the TV channel on the TV. This may affect the tuning of the DVD recorder.

?

1. On the TV set, select the programme number you want make the recording from.

2. Press **REC/OTR ●** with the DVD recorder **switched off**.

'WAIT' will appear on the display.
✓ The DVD recorder is comparing its stored TV channels with those on the TV set. Please do not change the TV channel on the TV set while 'WAIT' is displayed.

'NOT' appears in the display
✓ This TV channel could not be found in the DVD recorder's memory. Check that all the TV channels stored on the TV set are available on the DVD recorder. If necessary, store any missing channels. Please read paragraph 'Manual TV channel search' in the chapter 'Installing your DVD Recorder'.
✓ Check the connectors at both ends of the scart cable.
✓ Check your TV's operating instructions to see which scart socket is used for video signals.
✓ If the problem persists, you won't be able to use this feature.

Problem

3. Stop recording with **STOP ■** .

Switching 'Direct Record' on or off

1. Switch on the TV set. If required, select the programme number for the DVD recorder.

2. Press **SYSTEM-MENU** on the remote control. The menu bar appears.

3. Select '⚙' using ◀ or ▶ .

4. Select ***'Record settings'*** using ▼ or ▲ and confirm with ▶ .

5. Select ***'Direct Record'*** using ▼ or ▲ .

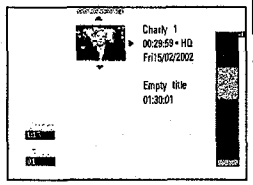
6. Select ***'On'*** (Direct Record on) or ***'Off'*** (Direct Record off) using ◀ or ▶ .

7. Confirm with **OK** .

8. Quit using **SYSTEM-MENU** .

9. Switch off with **STANDBY** ⏻ .

8 Managing the disc contents



General Information

ENGLISH

When a recording is made to disc, the following additional information is also stored at the beginning of the recording:
•) Name of the recording
If the TV station does not transmit a name, only the channel number and time will be stored as the name
•) Length of the recording
•) Record type (Quality)
•) Date of the recording
•) Index picture of the recording

A marker will be set every 5-6 minutes if the '***Auto chapters***' function is activated in the '***Record settings***' menu. This marker is known as a 'chapter'.
These markers can be changed when the recording has finished.

Can markers be set on a DVD+R disc?
Markers can be set on these discs if they have not been finalised.

It is also possible to add 'chapters' later. This means that scenes you do not want to see during playback, such as commercials, can be hidden or skipped. During playback you can watch your recording as a continuous sequence without the hidden chapters.

Read section '**Disc settings**' to change general settings of the disc.

Read '**Editing recording titles (name)**' to find out how to change a name.

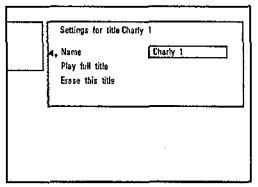
Read '**Playing back titles**' to find out how to play back the entire recording including the hidden chapters.

Read '**Erasing a recording/title**' to find how to erase titles and the accompanying recording.

Read '**Favourite scene selection**' to find out how to split the title into chapters and how to manage the chapters.

Editing recording titles (name)

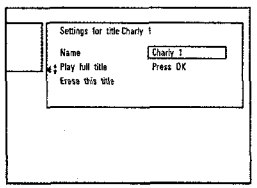
Some TV stations transmit the title (name) of a programme. In this case, the name will be included automatically (e.g. 'ROCKY'). Otherwise, the channel number and time of the recording are stored as the name. The name of the recording can only be changed after the recording has been completed.



1. Press the **STOP** ■ button or during playback press **DISC-MENU**.
2. Using ▲ or ▼ select the title whose name you want to edit and confirm with ▶. The menu for editing names appears.
3. Select '***Name***' using ▲ or ▼ and confirm with ▶.
4. Using ▶ or ◀ select the position where the letter/number/icon is to be changed/re-entered.
5. Change the icon using ▲ or ▼. You can switch between upper and lowercase using **SELECT**. You can delete the character using **CLEAR**.
6. Repeat 4 and 5 until you have made the changes you want.
7. Save the new name with **OK**. '***Storing name***' appears on the TV screen for confirmation.
8. To end, press ◀.

Playing back titles

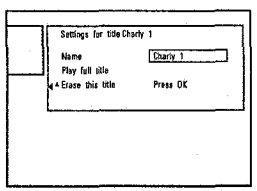
If you have hidden certain chapters of a title, with this setting you can view the entire title including the hidden chapters. Proceed as follows:



1. Press the **STOP** ■ button or during playback press **DISC-MENU**.
2. Using ▲ or ▼ select the title that you want to play back and confirm with ▶. The menu for editing titles appears.
3. Select '***Play full title***' using ▲ or ▼ and confirm with **OK**.
4. Playback begins automatically. The full title – including the hidden chapters - is played back.

Erasing a recording/title

You can erase individual recordings from a disc. Follow the instructions below:

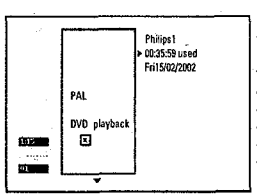


1. Press the **STOP** ■ button or during playback press **DISC-MENU**.
2. Using ▲ or ▼ select the title to be erased and confirm with ▶. The menu for editing titles appears.
3. Using ▲ or ▼ select '***Erase this title***' and confirm with **OK**. The screen will show '***This will completely erase this title***'.'***Press OK to confirm***'.
4. If you want to erase the title press **OK**. To end, press ◀.
5. The screen will show '***Erasing title***'.
6. '***Empty title***' will now appear in this position in the Index Picture Screen. A new recording can now be made at this position.
   If the deleted title was very short (shorter than 1 minute) no '***Empty title***' will be displayed.

Can titles be deleted from a DVD+R disc?

Titles on DVD+R discs are only marked as deleted. '***Deleted title***' will appear in the display instead of '***Empty title***'. During playback the 'deleted' title is skipped. The space used for this title cannot be used again as the title has not been physically deleted. Once the disc has been finalised no further changes can be made.

Disc settings



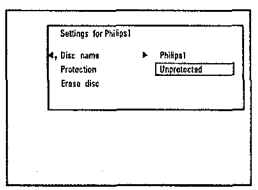
This screen appears **before** the first title and contains general information about the current disc.

You can:
- change the name of the disc
- activate or deactivate write protection on the disc
- Finish editing (make edits DVD compatible)
- Finalising DVD+Rs
- Erasing DVD+RWs

Follow the instructions to get to this screen:

1. Press the **STOP** ■ button or during playback press **DISC-MENU**.
2. Select the first title using ▲ or press **STOP** ■.
3. Press the ▲ button. The Disc Info screen will appear.

Changing the disc name



1. In the Disc Info screen press ▶. The '***Settings for***' menu appears on the TV screen.
2. Select '***Disc name***' using ▲ or ▼ and confirm with ▶.
3. Using ▶ or ◀ select the position where the letter/number/icon is to be changed/re-entered.
4. Change the icon using ▲ or ▼. You can switch between upper and lowercase using **SELECT**. You can delete the character using **CLEAR**.
5. Repeat 3 and 4 until you have made the changes you want.
6. Save the new title with **OK**. '***Storing name***' appears on the TV screen for confirmation.
7. To end, press ◀.

Finalising a disc

Even if one or more titles have been edited, a DVD player may still show the original title. You can prepare your disc so that a DVD player will be able to read the edited title.

1. In the Disc Info screen press ▶. The '***Settings for***' menu will appear on the screen.
2. Select '***Make edits compatible***' using ▲ or ▼ and confirm with **OK**.

× '***Make edits compatible***' does not appear
✓ Your disc is already compatible. No conversion is necessary.
To end, press **SYSTEM-MENU**.

3. The screen displays '***This will take...***' to show how long the process will last.
4. To confirm press **OK**. The screen will show '***Working...***'. A bar will move from left to right indicating the progress of the conversion.

ENGLISH

Finalising DVD+R discs

This feature is required to play back a DVD+R disc in a DVD player. Once the disc has been finalised no further recordings or changes can be made.

1. In the Disc Info screen press ▶ . The ***'Settings for'*** menu appears on the TV screen.
2. Select ***'Finalise disc'*** using ▲ or ▼ . and confirm with **OK** .

× *'Finalise disc'* does not appear
✓ Either there is no DVD+R disc inserted or the disc is already finalised. To end, press **SYSTEM-MENU** .

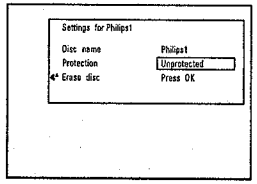
× *'Settings for'* does not appear
✓ If the disc has been recorded on another DVD recorder, the menu may not appear. In this case, use the ***'Finalise disc'*** feature in the 'T/A' menu, under ***'Features'***.

Problem

3. The screen displays ***'This will take'*** to show how long the process will last.
4. To confirm press **OK** . ***'Working'*** appears on the TV screen. A bar will move from left to right indicating progress.

Erasing DVD+RW disks

1. In the Disc Info screen press ▶ . The ***'Settings for'*** menu will appear on the screen.



2. Select ***'Erase disc'*** using the menu buttons ▲ or ▼ . Confirm with the menu button **OK** . The screen will show ***'This will erase all titles Press OK to confirm'***.
3. If you want to erase all titles press **OK** . Otherwise press ◀ to end.
4. The screen will show ***'Erasing disc'***.
5. Once the disc has been successfully erased the Index Picture Screen will show the empty area of the disc.

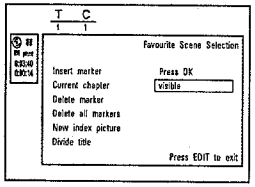
Favourite Scene Selection

In this menu, you can adjust a title to your personal preferences. You can insert/delete chapter markers, hide chapters, select a new index screen, or split the title. Display this menu during playback using **EDIT** on the remote control.

Inserting chapter markers

During playback you can set and erase chapter markers within a title.
The maximum number of chapters per disc is 124 and 99 per title. If one of these numbers are reached, the following message appears: ***'Too many chapters'***. Some markers must be erased before new markers can be added.

1. During playback press **EDIT** on the remote control at the appropriate position. The ***'Favourite Scene Selection'*** menu will appear on the screen.



2. Confirm ***'Insert marker'*** using **OK** . The screen displays ***'Inserting marker'***.

'X' will appear on the screen:
This DVD is write-protected or the disc is a finalised DVD-R. Subsequent changes cannot be made.

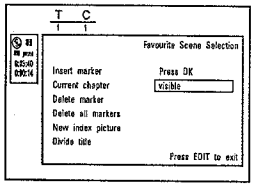
Tip

3. To stop the feature, press **EDIT** .

Hiding chapters

By default all chapters are visible. Chapters (such as commercials) can be hidden during playback or made visible again. In editing mode, hidden chapters are shown greyed out.

1. During playback of the appropriate chapter press **EDIT** on the remote control. The ***'Favourite Scene Selection'*** menu will appear on the screen.



How do I select other chapters?
1. Press ' T/C ' on the remote control. The title and chapters are shown at the top of the screen.
2. Using ▶ or ◀ select Title(T) or Chapter (C).
3. Using ▲ or ▼ select the title or chapter you wish to edit.

Tip

2. Select ***'Current chapter'*** using ▼ .

❸ Using ▶ select *'hidden'*. The picture is shown darker.

Switching quickly
You can switch between show chapters (*'visible'*) and hide chapters (*'hidden'*) quickly and easily using **SELECT**.

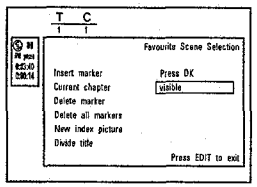
Tip

❹ To end, press **EDIT**.

During playback this chapter will be skipped.
If the chapter is not visible, select *'visible'* in step ❸ with ▶.

Erasing chapter markers

You can erase all or some of the markers within a title.



❶ During playback of the appropriate chapter press **EDIT** on the remote control. The *'Favourite Scene Selection'* menu will appear on the screen

How do I select other chapters?
❶ Press ' **T/C** ' on the remote control. The title and chapters are shown at the top of the screen.
❷ Using ▶ or ◀ select Title(T) or Chapter (C).
❸ Using ▲ or ▼ select the title or chapter you wish to edit.

Tip

❷ Using ▼ select *'Delete marker'* for this chapter or *'Delete all markers'* for all chapters within the selected title.

❸ Confirm with **OK**.

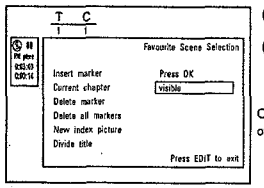
❹ To end, press **EDIT**.

Changing the index picture

Normally the first picture of a recording is used as the index picture. You can however choose any picture from the recording as the index picture.

❶ During playback, search for location of the new index picture. Press the **PLAY/PAUSE►II** button.

❷ Press the **EDIT** button. The *'Favourite Scene Selection'* menu appears on the TV screen.



❸ Select line *'New index picture'* and confirm with **OK**.

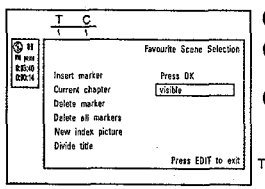
❹ Start the change with **OK**. *'Updating menu'* appears on the TV screen.

Once the revision has been completed successfully the DVD recorder reverts to the index overview.

Dividing titles

It is possible to divide a title into several separate parts (titles). Each of these parts (titles) is indicated by a separate index picture.
Please note: This division cannot be reversed

Can I also divide titles on DVD+R discs?
As recordings on DVD+R discs cannot be overwritten, it is not possible to divide titles.



❶ During playback of the appropriate title press **EDIT** on the remote control. The *'Favourite Scene Selection'* menu will appear on the screen

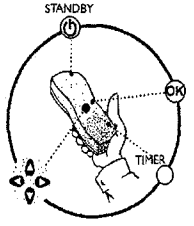
❷ Select *'Divide title'* and confirm with **OK**.

❸ If you are sure, start the process by pressing **OK**. The screen will show *'Dividing title'*.

❹ Wait until the new title appears with an index picture in the Index Picture overview.

The title is now successfully divided.

9 Programming a recording (TIMER)



General information

ENGLISH

Use programmed recording (TIMER) to automatically start and stop a recording at a later date. The DVD recorder will switch to the right program number and begin recording at the correct time.
With this DVD recorder, you can pre-program up to 6 recordings within a period of one month.

To make a programmed recording, your DVD recorder needs to know:
* the date you want to make the recording
* the program number of the TV channel
* the start and stop time of the recording
* VPS or PDC on or off
* the recording mode (*'HQ/SP+/LP/EP+'*).

This information is saved in a TIMER block.

What is 'VPS/PDC'?

'VPS' (Video Programming System)/ 'PDC'(Programme Delivery Control) are used to control the start and duration of TV channel recordings. If a TV programme starts earlier or ends later than was scheduled, the DVD recorder will still switch itself on and off and the correct times.

What do I need to know about 'VPS/PDC'?

Usually the start time is the **same** as the VPS or PDC time. But if your TV guide gives a VPS or PDC time which is different from the programme's start time, e.g. '20.15 (VPS/PDC 20.14)', you must enter the **VPS/PDC time '20.14' exact to the minute** as the start time.
If you want to programme a time that is different from the VPS or PDC time, you must switch off VPS or PDC.

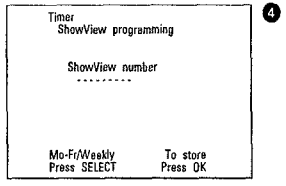
Only one TV programme on a TV channel can be controlled using 'VPS/PDC' at a time. If you want to record two or more TV programmes on a TV channel using 'VPS/PDC', you will need to programme these as two separate recordings.

Programming a recording (with 'ShowView ® ')

SHOWVIEW®

Thanks to this programming system, you no longer need to tediously enter the date, programme number, start and end times. All the information needed by the DVD recorder for programming is contained in the ShowView® - programming number. This 9-digit ShowView® - number is found in most TV listings magazine.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **TIMER** on the remote control.
   The programming method last selected is marked.
3. Select *'ShowView programming'* using ▼ or ▲ and confirm with ▶ .



4. Enter the entire ShowView number. This number is up to 9 digits long and can be found next to the start time of the TV programme in your TV listings magazine.
   e.g.: 5-312-4 or 5 312 4
   Enter 53124 for the ShowView number.
   If you make a mistake, you can clear it with **CLEAR** .

Selecting daily/weekly recordings
Using **SELECT** , select from the following options:
'Mo-Fr': Repeated daily recordings from Monday to Friday.
'Weekly': Repeated weekly recordings (every week on the same day).

Tip

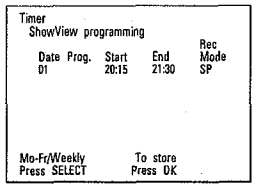
5. Confirm with **OK** .

× **The following message appears on the screen: *'Please enter programme number'***
✓ The programme number of the TV channel has not yet been assigned to the ShowView number. Using ▶ and ◀ or the number buttons **0..9** on the remote control, select the corresponding programme number (name) of the TV channel and confirm with **OK** .

× **The following message appears on the screen: *'ShowView number wrong'***
✓ The ShowView number entered is incorrect. Correct your entry or cancel using the **SYSTEM-MENU** button.
✓ Check the time/date (see 'Setting the time and date' in 'Installing your DVD recorder'.

× **The following message appears on the screen: *'Weekend programming not possible'***
✓ A daily recording was entered for the wrong day. Daily programming can only be used for recordings to be made from Monday to Friday.

Problem



6 The decoded information appears after confirmation. You can go back at any time to change the information. Select the appropriate input field using ▶ or ◀. If required, change the information using **CHANNEL +**, **CHANNEL −** or the number buttons **0..9**.

Tip

Switching on 'VPS/PDC' in the *'Start'* input field

Select the *'Start'* input field using ▶. Using **SELECT** switch on 'VPS/PDC' ('*' lights up). If you press **SELECT** again, you will switch 'VPS/PDC' off ('*' disappears).

Changing the recording quality in the *'End'* input field

Select the *'End'* input field using ▶. Using **SELECT**, select the recording mode *'HQ, SP+, EP, EP+'*.

7 If all the information is correct, press the **OK** button. The programming information is stored in a TIMER block.

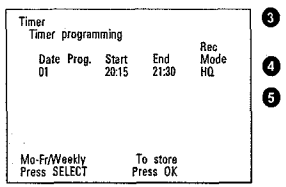
8 To end, press **TIMER**.

9 Load a DVD (unprotected) ready for recording.
The current disc is checked.

10 Switch off with **STANDBY** ⏻.
The programmed recording will only function properly if the DVD recorder has been **switched off** using the **STANDBY** ⏻ button.

If any of the TIMER blocks are in use, '⏲' will light up on the display.

Programming a recording (without ShowView®)



1 Switch on the TV set. If required, select the programme number for the DVD recorder.

2 Press **TIMER** on the remote control.
The programming method last selected is marked.

3 Select *'Timer programming'* with ▼ or ▲ and confirm with ▶.
The current information will appear on the screen.

4 Select the input field with ◀ or ▶.

5 Enter information with ▼ or ▲ or with the number buttons **0..9**.

Tip

Selecting daily/weekly recordings

In *'Date'* use **SELECT** to select from the following options:
'Mo-Fr': Repeated daily recordings from Monday to Friday
'Mo': Repeated weekly recordings (every week on the same day, e.g. Monday).

Programme numbers of scart sockets *'EXT1'* and *'EXT2'*

You can also programme recordings from external sources via scart socket **EXT 1 TO TV-I/O** (*'EXT1'*) or **EXT 2 AUX I/O** (*'EXT2'*).

'Switching on 'VPS/PDC' in the *'Start'* input field

Select the *'Start'* input field using **TIMER**. Using **SELECT** switch on 'VPS/PDC' ('*' lights up). If you press **SELECT** again, you will switch 'VPS/PDC' off ('*' disappears).

Changing the recording quality in the *'End'* input field

Select the *'End'* input field using **TIMER**.
Using **SELECT**, select the recording mode *'HQ, SP+, EP, EP+'*.

6 If all the information is correct, press **OK**. The programming information is stored in a TIMER block.

7 To end, press **TIMER**.

8 Load a DVD (unprotected) ready for recording.
The cassette is being checked.

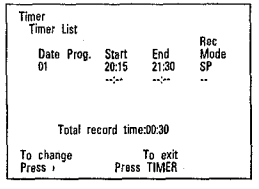
9 Switch off with **STANDBY** ⏻.
The programmed recording will only function properly if the DVD recorder has been **switched off** using the **STANDBY** ⏻ button.

If any of the TIMER blocks are in use, '⏲' will light up on the display.

How to check, change or delete a programmed recording (TIMER)

ENGLISH

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **TIMER** on the remote control.
   The programming mode last selected is marked.
3. Select '*Timer List*' with ▼ or ▲ , and confirm with ▶ .



4. Select the programmed recording (TIMER) you want to check, change or delete with ▼ or ▲ .

Delete programmed recording

1. Press the **CLEAR** button.
2. Confirm with **OK** . '*Timer Cleared*' will briefly appear on the TV screen.
   '– –:– –' appears rather than the displayed values
3. To end, press **TIMER** .

Tip

5. Press ▶ .
   Select the input field with ◀ or ▶ .
   If required, change the information with **CHANNEL +** , **CHANNEL –** or the number buttons **0..9** .
6. Confirm with **OK** .
7. To end, press **TIMER** .
8. Switch off with **STANDBY** ⏻ .

'NexTView Link'

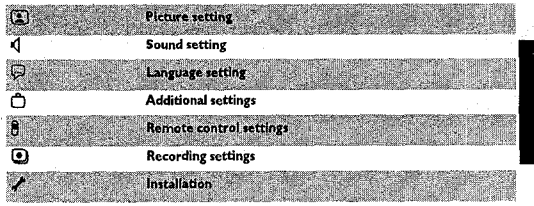
This DVD recorder is equipped with the 'NexTView Link' function. If your television is also equipped with this feature, you can mark TV programmes on the television for programming. These TV programmes will automatically be transmitted to a TIMER block on the DVD recorder. If you clear this marking on the television, the corresponding TIMER block on the DVD recorder will also be cleared.
For more information, read the instruction manual for your TV set.

Problem solving for programmed recordings

PROBLEM	SOLUTION
DVD recorder is not responding	✓While a programmed recording is being made, you cannot operate your recorder manually. If you want to cancel the programmed recording, press **STANDBY** ⏻ .
'*Switch off, timer recording*' flashes on the TV screen.	✓The DVD recorder was switched on several minutes before the start of a programmed recording. Switch off the DVD recorder with **STANDBY** ⏻ . A programmed recording (timer) will only function if the DVD recorder is switched off (button **STANDBY** ⏻).
Error message: '*Insert recordable disc*'	✓Either no disc has been inserted or you cannot record to this disc. Insert a disc that you can record onto. Switch off the DVD recorder using **STANDBY** ⏻ .
The error message '*Disc locked*' appears briefly on the screen.	✓A write-protected disc has been inserted. Cancel the protection (see 'Preventing accidental erasing of discs' in 'Manual Recording') or insert a different disc.
Error message: '*Memory full*'	✓If this error message appears after pressing **TIMER** , then all the TIMER blocks are already programmed. No more recordings can be programmed. Press the ▶ button. If you want to clear or check a programmed recording (TIMER block), select it with **CHANNEL +** or **CHANNEL –**
The '*Data error*' message appears on the screen.	✓The data for the recording could not be transferred. Please check the date, start time and end time of the programmed recording.
'*Collision*' appears on the screen.	✓The information for two programmed recordings overlap. ✓If you ignore this error message the TV programme with the earlier start time will be recorded first. You will miss the start of the second programme. ✓Change the information for one of the recordings. ✓Delete one of the recordings

10 User preferences

In this section you will learn how to set your user preferences on the DVD recorder. The symbols have the following meanings:

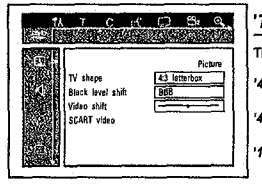


ENGLISH

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **SYSTEM-MENU** on the remote control. The menu bar appears.
3. Select the 'TV' icon using ◄ or ► and confirm with ▼ .
4. Select the appropriate feature using ▼ or ▲ and confirm with ► .
5. Select the corresponding line using ▼ or ▲ and confirm with ► .
6. Select the appropriate feature using ▼ or ▼ or the setting using ◄ or ► .
7. Confirm the setting with **OK** .
8. Quit the menu item using ◄ .

Picture settings

You can choose the following features in this menu:



'TV shape'

The picture signal from your DVD Recorder can be set to match your TV screen:

'4:3 letterbox' : for a 'wide-screen' picture with black bars at the top and bottom

'4:3 panscan' : for a full-height picture with the sides trimmed

'16:9' : for a wide-screen TV set (screen edge ratio 16:9)

'Black level shift'

Adapts the colour dynamics for NTSC playback

'Video shift'

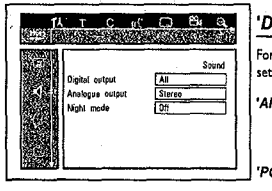
Use this feature to adjust the position of the picture on your TV left or right using ◄ , ► to suit your TV set.

'SCART video'

By default the recorder is set to ***'RGB'***. Select ***'S-Video'*** if you want to connect an S-VHS recorder.

Sound settings

Depending on which audio outputs are used, you can select the settings in this menu.
If you only use the analogue audio output (**OUT L AUDIO R**), select the settings ***'Off'*** in the ***'Digital output'*** menu.



'Digital output'

For devices connected to the **DIGITAL AUDIO OUT** socket, you can select from the following settings.

'All': Dolby Digital and DTS signals are fed unaltered to the digital output. MPEG-2 multi-channel signals are converted to PCM (Pulse Code Modulation).
For receivers/amplifiers **with digital multi-channel sound decoders.**

'PCM only': Dolby Digital and MPEG-2 multi-channel signals are converted to PCM (Pulse Code Modulation).
For receivers/amplifiers **without digital multi-channel sound decoders.**

'Off': Digital output switched off.
For devices **with analogue audio input.**

'Analogue output'

For devices connected to the analogue audio output (**OUT L AUDIO R**), you can select from the following settings.

'Stereo': For devices without DolbySurround or TruSurround. Use this setting if the DVD recorder is only connected to a stereo TV set.

'Surround': Dolby Digital and MPEG-2 multi-channel are mixed down to a DOLBY surround-compatible two-channel output signal. For recorders **with Dolby Surround Pro Logic decoder .**

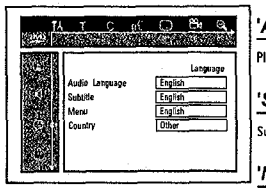
'3D sound': The six channels of the digital surround sound (Dolby Digital, MPEG-2) are mixed down to a two-speaker output signal. All original audio information is retained The result is an impression of being surrounded by several loudspeakers.
For TruSurround compatible devices.

'Night mode'

Night mode optimises the sound for playback at low volume. You are therefore less likely to disturb your neighbours. This only works for Dolby Digital audio on DVD video discs.

Language settings

You can choose the following settings in this menu:



'Audio Language'

Playback audio language*Audio Language'*,

'Subtitle'

Subtitle language

'Menu'

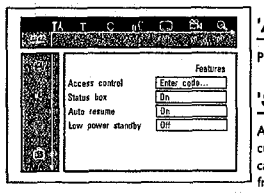
Screen menu language

'Country'

'Country'

Additional settings

You can select the following functions in this menu:



'Access control'

Please read the next chapter 'Access control (child lock)'

'Status box'

Along with the on screen menu, the OSD (On Screen Display) also displays information on the current operating status (counter, playback, recording, TV channel, etc.) on the TV screen. You can switch off the information about the operating status to avoid recording it when recording from additional devices.

'On': The OSD information appears in every selected mode for a few seconds and disappears again.

'Off': The OSD information is switched off. It is **no longer** displayed on the screen.

Auto resume

If playback of a pre-recorded DVD video disc or video CD is interrupted (button **STOP** ■ or **OPEN/CLOSE**) when the disc is reloaded (disc is started) playback starts at the precise location where it stopped. This applies not only to the current disc but to the last 20 discs played.

This feature can be switched off if not required.

Low power standby

To save power, you can switch off the clock display on the DVD recorder. Programmed (TIMER) recordings will still take place.

'On': If the DVD-Recorder is switched off (button **STANDBY** ⏻), the clock display is also switched off.

'Off': If the DVD-Recorder is switched off (button **STANDBY** ⏻), the clock display is visible.

'PBC'

This line appears only if a VCD is loaded.
This function lets you activate or deactivate the PBC menu (Playback Control) for video CDs. See 'Playing a (Super) Video CD'.

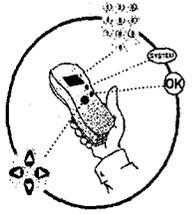
Remote Control settings

In this menu you can set the remote control type to which your DVD recorder should respond to.

'DVD player': The DVD recorder responds to a DVD player remote control.
The DVD recorder also responds to the remote control of a DVD player (remote control code RC-6). Choose this setting if your Philips TV remote supports DVD functions.

'DVD recorder': The DVD recorder only responds to the supplied remote control.

11 Access control (Child Lock)



Child lock (DVD and VCD)

This feature enables discs to be locked for children.
When Child Lock is on, a 4-digit code (PIN) needs to be entered before a disc can be played.
You can also decide whether the inserted disc should always be played or should be played only once, despite the child lock

ENGLISH

•)'***Play always***':
This disc is stored in a memory with space for 50 child-safe discs. If more than 50 discs are stored, the last disc in the list is removed and the new disc is added. The screen shows 'Child safe' at the start of playback.

•)'***Play once***':
This disc is only authorised for single playback. If the recorder is switched off, the PIN code must be re-entered.

Activating/deactivating child lock

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON**.
3. Press **SYSTEM-MENU**. The menu bar appears
4. Select the 'T' icon using ◄ or ►.
5. Select '***Features***' using ▼ or ▲ and confirm with ►.
6. Confirm '***Access control***' using ►.
7. Enter a 4-digit code of your choice. Enter the same code again as confirmation.
8. Select '***Child lock***' using ▲ or ▼ and confirm with ►.
9. Select the 'locked' icon using ▼ or ▲.
10. Confirm with **OK**.
11. Quit the feature using ◄ and **SYSTEM-MENU**.

Unauthorised discs can only be played by entering the four-digit PIN code.
To deactivate the child lock, select the 'unlocked' icon in 9.

Authorising a disc

1. Insert a disc. The access control box will appear after a short delay.
2. Using ▲ or ▼ select '***Play once***' or '***Play always***'.
3. Enter your PIN code using the number buttons **0..9**.

Double-sided DVDs may have a different ID for each side. For these discs, each side must be authorised. Multi-volume video CDs may have a different ID for each volume. For these CDs, each volume must be authorised.

Locking unlocked discs

To lock a disc that was formerly authorised follow the instructions below

1. Insert a disc. Playback starts automatically. If the playback does not start automatically, press **PLAY/PAUSE ►II**.
2. Press the **STOP ■** button while the '—unlocked—' icon is visible. The icon changes to '—locked—'. The disc is now locked.

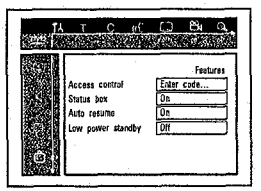
Parental level control (DVD video only)

Films on pre-recorded DVD discs may contain scenes not suitable for children. Therefore, some discs may contain 'Parental Control' rating information that applies to the entire disc or to certain scenes on the disc.

If the disc is rated, scenes are rated from 1 to 8 If such a scene is detected during playback, it compares the scene with the filter value set on the DVD recorder. If the filter value is higher that the setting, an alternative scene is played back where possible.

Activating/deactivating parental level control

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON**.
3. Press **SYSTEM-MENU**. The menu bar appears
4. Select the 'T' icon using ◄ or ►.
5. Select '***Features***' using ▼ or ▲ and confirm with ►.



6. Confirm '***Access control***' using ▶ .
7. Enter a 4-digit code of your choice. If the code is new, you may have to enter the code a second time as confirmation.
8. Select the '***Parental level***' using ▲ or ▼ and confirm with ▶ . A bar appears to select the parental level.
9. Select the appropriate rating using ▼ , ▲ or the number buttons **0..9** .

What do the ratings mean?
Rating 0 (displayed as '--') parental control not active.
Rating 1 (suitable for children)
Rating 8 (only suitable for adults)
What happens if a DVD scene contains a higher level than the rating set?
If the recorder does not find a suitable alternative, playback will stop and you must enter the four-digit code.

Tip

10. Confirm with **OK** . Quit using ◀ and **SYSTEM-MENU** .

Changing the country

The set filter values depend on the respective country. It is therefore necessary to enter the country to which these filter values apply.

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON** .
3. Press **SYSTEM-MENU** . The menu bar appears
4. Select the 'T' icon using ◀ or ▶ .
5. Select line '***Features***' using ▼ or ▲ and confirm with ▶ .
6. Confirm the line '***Access control***' using ▶ .
7. Enter your four-digit code.
8. Select '***Change country***' using ▼ or ▲ and confirm with ▶ .
9. Select the corresponding country using ▲ or ▼ and confirm with **OK** .
10. To end, press ◀ and then **SYSTEM-MENU** .

Changing the PIN code

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Switch on the DVD recorder using **STANDBY/ON** .
3. Press **SYSTEM-MENU** . The menu bar appears
4. Select the 'T' icon using ◀ or ▶ .
5. Select '***Features***' using ▼ or ▲ and confirm with ▶ .
6. Confirm '***Access control***' using ▶ .
7. Enter your four-digit PIN code.
8. Select '***Change code***' using ▲ or ▼ and confirm with ▶ .
9. Enter the new code using the number buttons **0..9** . Enter the same code again as confirmation.
10. Quit using ◀ and **SYSTEM-MENU** .

I have forgotten my code
Press **STOP** ■ four times, then press **OK** . Access control is now switched off. You can now enter a new code as described above.

Tip

12 Before you call an engineer

If you have any problems using this DVD recorder, the reason may be one of the following. You can also call the **customer service centre** in your country.
The telephone numbers can be found on the back of this instruction manual.
Have the model number (MODEL NO) and the production number (PROD.NO) of your recorder ready.
The serial number (PROD. NO.) is printed on the type plate at the back.

ENGLISH

PROBLEM	SOLUTION
Your recorder does not respond to any button being pressed and the display shows 'TV ON ':	✓Recorder in initial installation mode: Switch on the TV, switch over to the DVD recorder socket. Now the menu for language selection should appear. Please read paragraph 'Initial Installation' in the chapter 'Installing your DVD Recorder'.
The device does not react when you press a button, although the remote control works:	✓'Dealer-Mode' is switched on: All buttons on the front of the set are locked. Switch off the function: ❶ Pull out the mains plug from the wall outlet. ❷ Press and hold down ■**STOP** and **OPEN/CLOSE** and put back the mains plug into the wall outlet. ❸ As soon as the time or '--:--' appears in the display (ca. 6 - 10 seconds), release ■**STOP** and **OPEN/CLOSE**.
Your DVD recorder does not respond to any button being pressed:	✓There is no power supply: check the power supply ✓A programmed recording (Timer) is currently being made: If desired, cancel the programmed recording (Timer) with **STANDBY** ⏻. ✓There is a technical problem: disconnect from the mains power supply for 30 seconds, then connect again. If this doesn't help, you can reset your DVD recorder to the default factory settings.
Resetting the machine to the default factory settings	✓**Important:** All the information stored (TV channels, time and date, TIMER) will be lost. ❶ Disconnect from the mains power supply. ❷ Press and hold down the **STANDBY/ON** button on the device and reconnect to the mains power supply. ❸ Release the **STANDBY/ON** button when 'TV ON ' appears on the display. All the information stored (TV channels, time and date, TIMER) will be lost. Please read paragraph 'Initial Installation' in the chapter 'Installing your DVD Recorder'.
Remote control does not work:	✓Remote control not pointed toward the DVD recorder: Point the remote control at the machine. ✓There is a technical problem: Take out the batteries, wait for 10 seconds and put them in again. ✓Batteries are flat: Change the batteries.

PROBLEM	SOLUTION
No playback on DVD recorder:	✓There is no recording on the disc: Change disc. ✓You inserted the wrong disc type: Your recorder can play back the following disc types: DVD Video, (Super)Video CD, DVD+R(W), Audio CD, , MP3 CDs ✓You inserted the disc the wrong way: Insert the disc with the label facing upwards ✓Disc is dirty: Clean the disc ✓Wrong region code: The region code of the DVD and the DVD recorder must match. ✓Parental control is on: Read chapter 'Access control (child lock)' ✓You have selected the wrong programme number for the DVD recorder on the TV: on the TV, select the correct programme number for the DVD recorder. ✓The cable connecting the TV set and the DVD recorder has come loose: check the cable.
I cannot playback (Super) Video CDs	✓It is possible that this (Super) Video CD contains a menu and the 'PBC' is switched off. You can see this in status field '*PBC OFF*'. To activate this function, proceed as follows: ❶ Press **SYSTEM-MENU** while the (Super) Video-CD is inserted. ❷ Select '*TA*' using ◄ or ► ❸ Select line '*Features*' using ▼ or ▲ and confirm with ► ❹ Select '*On*' in line '*PBC*' using ▼ or ▲. ❺ Confirm with **OK** and end with **SYSTEM-MENU**.
Poor playback on DVD recorder: (distorted picture/distorted sound)	✓Your TV set is not properly adjusted. ✓Disc is dirty: Clean the disc ✓Sometimes the picture may be temporarily distorted. This is not a defect of your DVD recorder.
No recording possible:	✓The TV channel you want to record is not stored or you selected the wrong programme number: Check TV channels stored. ✓Disc write-protected (recording protected): Remove write-protection or change the disc. For more information, please see 'Preventing accidental erasing of discs' in chapter 'Manual Recording'. ✓An already finalised DVD+R has been inserted: Change disc.
Programmed recording does not work:	✓You have programmed the wrong time or date: Check time/date. ✓You have not set the TIMER properly: Check the programmed recordings (TIMER block). ✓Locked disc inserted: Remove disc lock. ✓An already finalised DVD+R has been inserted: Change disc. ✓'VPS/PDC' switched on but 'VPS/PDCtime' wrong: 'Enter 'VPS/PDCtime exactly to the minute. Check the aerial.
The wrong TV channel was decoded (entered) after you programmed a recording using ShowView.	❶ Enter the ShowView programming number of the TV channel you want. ❷ Confirm with **OK**. ❸ Check the programme number/channel name in the '*Prog.*' input field ❹ If this does not correspond to the TV channel you want, select the input field and change the programme number/channel name. ❺ Confirm with **OK**.
There is picture or sound interference on TV reception:	✓Switch to recording mode 'HQ' with **REC MODE** during playback from the internal TV tuner (**MONITOR** button). This will help achieve the best possible picture quality. Before recording, select the recording mode as described in chapter 'Manual Recording', section 'Selecting the recording mode (quality)'. ✓Have your aerial checked. ✓You will find information on how to change the TV system in 'Manual TV channel search' in 'Installing your DVD recorder'.

PROBLEM	SOLUTION
Distorted sound coming from a connected hi-fi amplifier	✓The DVD recorder is connected to the 'Phono-input' of your amplifier. This socket is provided only for record players without a preamplifier. Select a different audio input.
The picture is distorted or black-and-white during playback	✓The TV system of the disc does not match that of your TV set (PAL/NTSC). ✓The recording can be made in colour only when the TV channels or the connected additional device send a colour signal. Black-and-white signals containing no color information (colour subcarriers) cannot be recorded.
No sound signal at the digital output	✓Check whether the sound settings match the selected inputs and connected additional devices. ✓Check whether you have inserted an MP3 CD. In accordance with SDMI (Secure Digital Music Initiative), the digital audio output is turned off during MP3 playback. This is not a defect of your DVD recorder.
A DVD+RW disc cannot be played on certain DVD players	✓If a recording is too short, it is possible that a DVD player cannot detect it: Please observe the following 'Minimum recording times': Recording mode '***HQ***': 5 minutes, '***SP+***': 15 minutes, '***EP***': 20 minutes, '***EP+***': 30 minutes ✓Some DVD players cannot play back DVD+RW recordings. You can solve this problem by using a special function. You can solve this problem by using a special function: ❶ Open the disc tray with **OPEN/CLOSE** . Insert the disc but do not close the tray. ❷ Hold down the number button **2** on the remote control until the tray closes. The disc is modified. ❸ If this fails to produce the desired result, repeat the procedure using the number button **3** on the remote control. ❹ You can restore the disc to its original condition by pressing **1** . **Warning!** There is a risk that you can no longer play the disc on other DVD players after this procedure. Therefore, apply this function with particular care.
Other disc errors	✓If it is impossible to play back a disc, you can try and repair it for new recordings using the following function. This will only prepare the disc for erasing. It will not be erased, however, until the recording has been completed. ❶ Clean the disc. ❷ Open the disc tray with **OPEN/CLOSE** . Insert the disc but do not close the tray. ❸ Hold down **CLEAR** on the remote control until the tray closes. The disc is prepared for erasing. ❹ Start recording as with an empty disc.

4. Mechanical Instructions

4.1 Service Positions

4.1.1 Front

Front

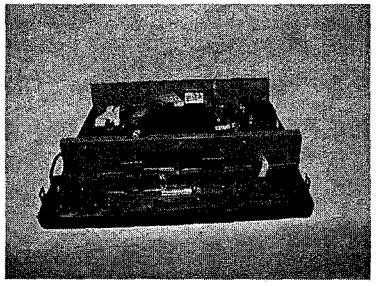


Figure 4-1

4.1.2 DVIO board

To put the DVIO board in a service position, an extender board must be used. This extender board can be ordered with codenumber 3104 128 07770.

DVIO Extender

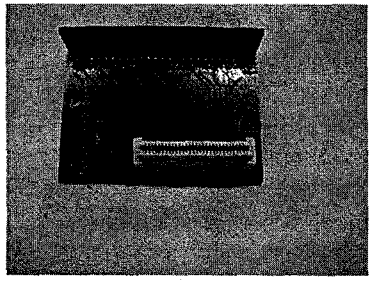


Figure 4-2

DVIO 1

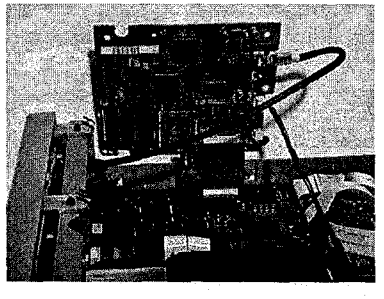


Figure 4-3

DVIO 2

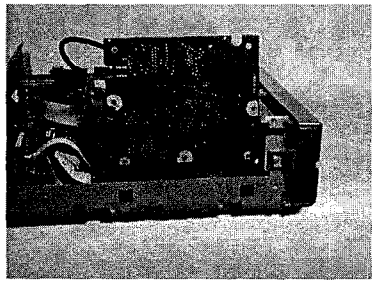


Figure 4-4

4.1.3 Digital board

After demounting of DVIO board, the top side of the digital board is in reach. To reach the bottom side of the digital board, the DVDR module must be demounted together with the digital board. Connected to each other, the assembly can be set in a service position. In this position, the bottom side of the digital board and the servo board are in reach to be serviced.

Digital 1

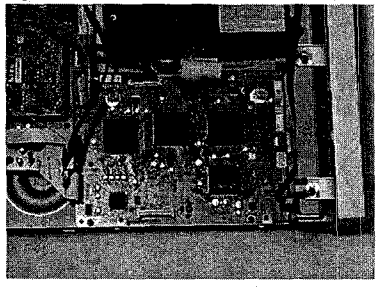


Figure 4-5

Digital 2

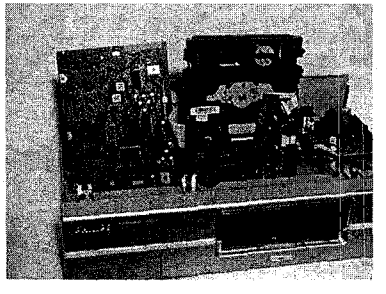


Figure 4-6

4.1.4 Analog board

To put the analog board in service position, demount the assembly of analog board and backplate as follows:

1. Remove the screw from the backplate to the mains inlet of the power supply
2. Remove the screw safety holder
3. Remove the 3 screws of the analog board to the frame
4. Release the snap of the spacer of the analog board to the frame.

Turn the assembly of the back plate and the analog board against the loader.

Analog Europe

Figure 4-7

Analog NAFTA

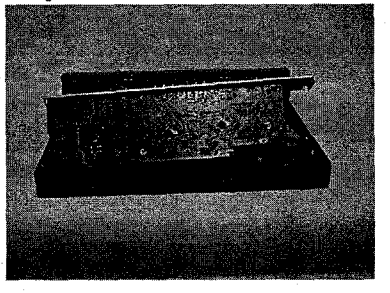


Figure 4-8

4.1.5 Cable Routing

Take care of the correct cable routing. See pictures below.

Europe

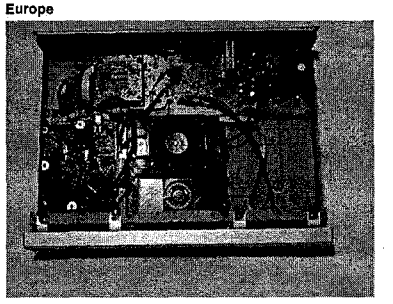


Figure 4-9

NAFTA

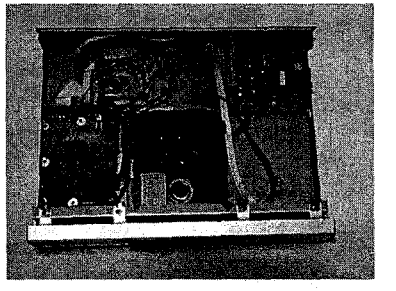


Figure 4-10

4.2 Exploded View of the Set

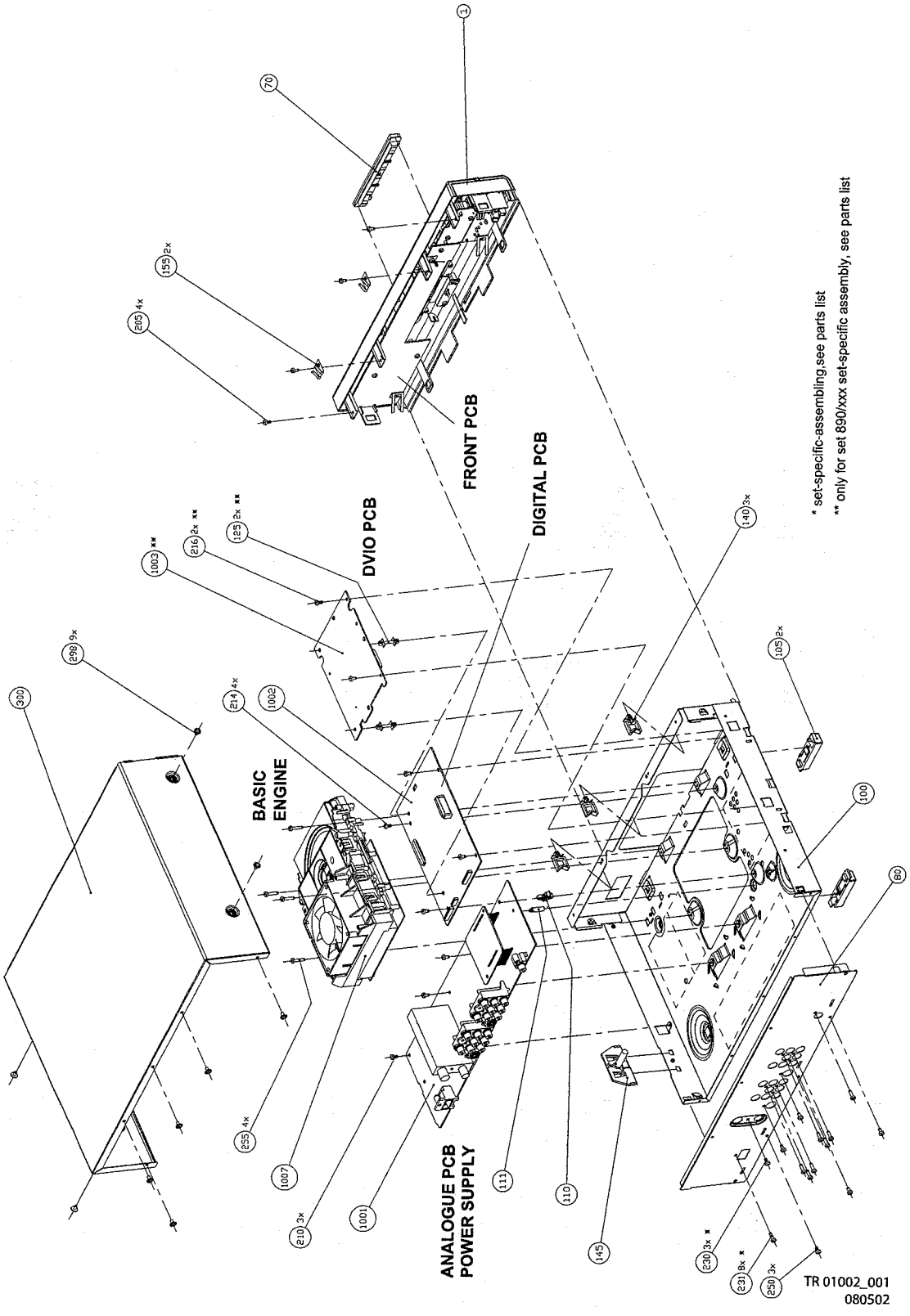
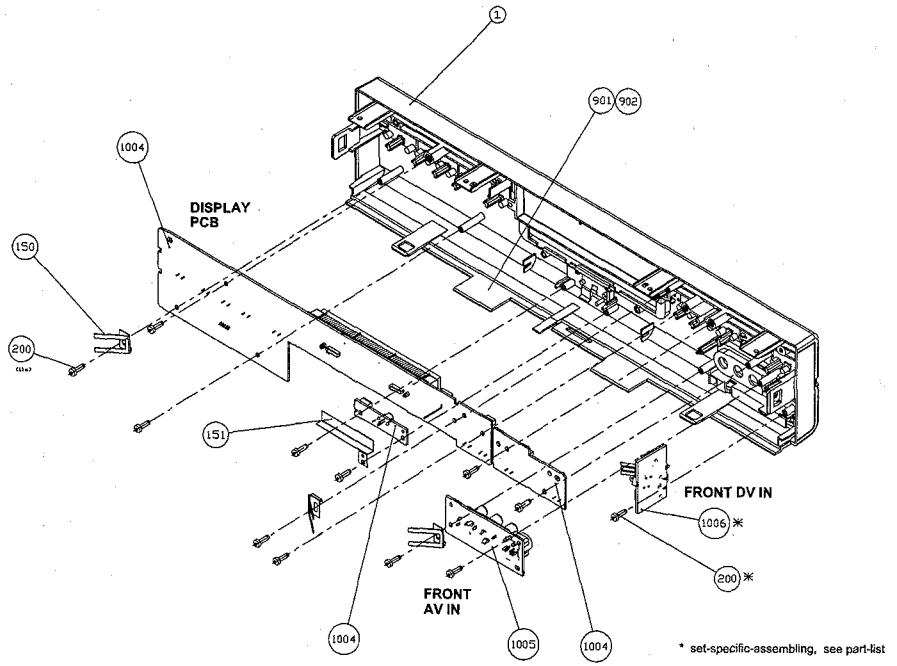


Figure 4-11

4.3 Exploded View of the complete Front Panel



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080502

Figure 4-12

4.4 Exploded View of the Front without PWBs

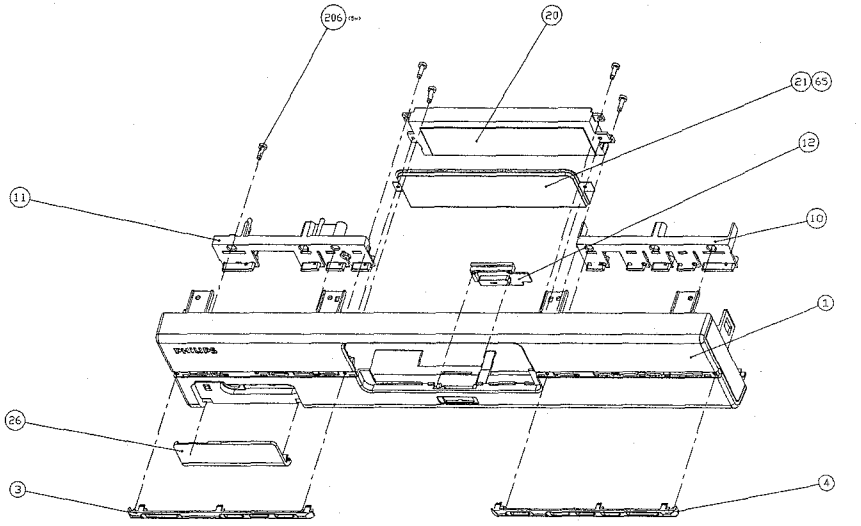

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Figure 4-13

4.5 Dismantling Instructions

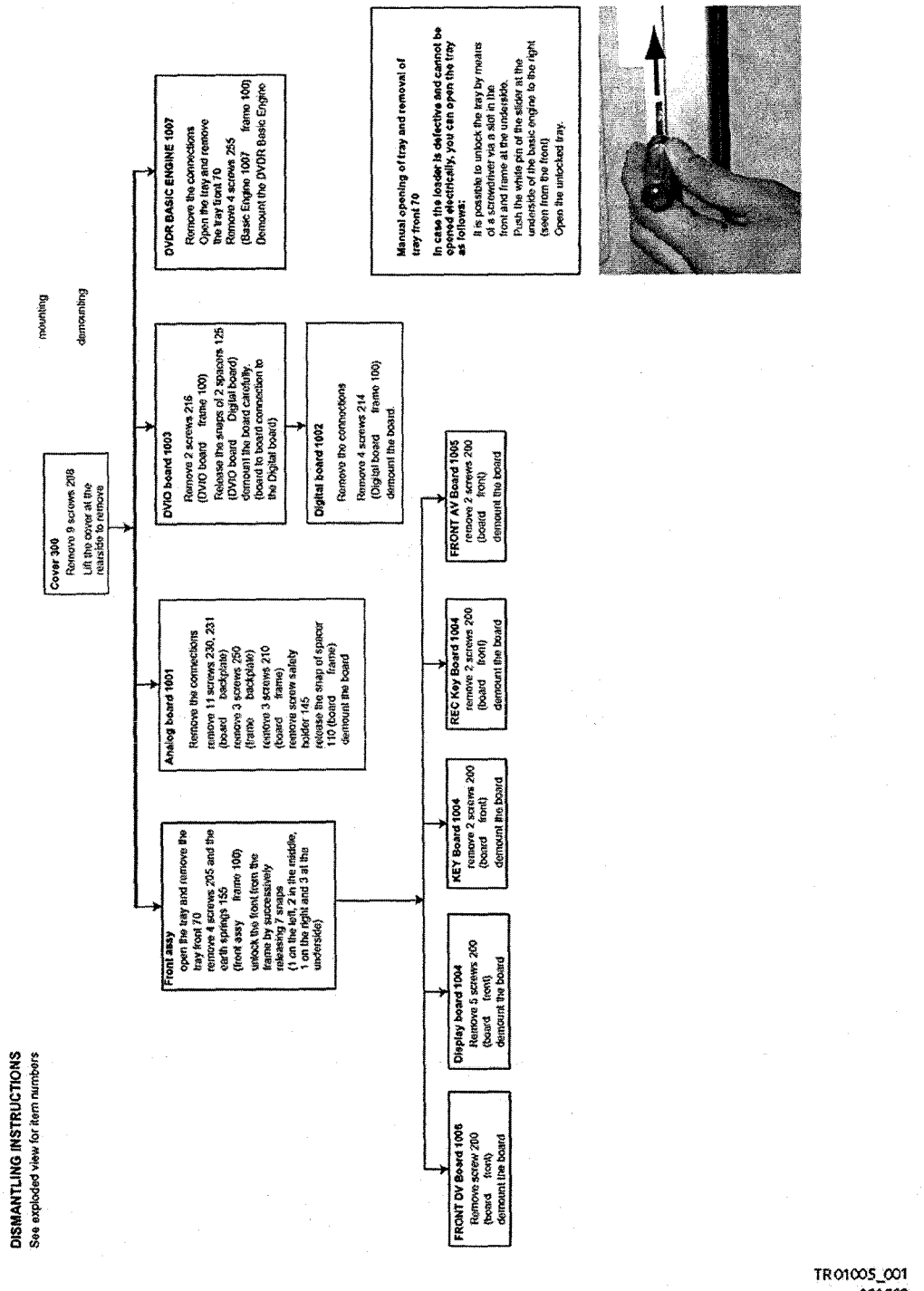


Figure 4-14

5. Diagnostic Software

Due to the complexity of the DVD recorder, the time to find a defect in the recorder can become long. To reduce this time, the recorder has been equipped with Diagnostic and Service software (DS). The DS offers functionality to diagnose the DVDR hardware and tests the following:

- Interconnections between components
- Accessibility of components
- Functionality of the audio and video paths

This functionality can be accessed via several interfaces:

1. End user/Dealer script interface
2. Player script interface
3. Menu and command interface

5.1 End User/Dealer Script Interface

5.1.1 Description

The End user/Dealer script interface gives a diagnosis on a stand alone DVD recorder; no other equipment is needed. During this mode, a number of hardware tests (nuclei) are automatically executed to check if the recorder is faulty. The diagnosis is simply a "fail" or "pass" message. If the message "FAIL" appears on the display, there is apparently a failure in the recorder. If the message "PASS" appears, the nuclei in this mode have been executed successfully. There can be still a failure in the recorder because the nuclei in this mode don't cover the complete functionality of the recorder.

5.1.2 Contents

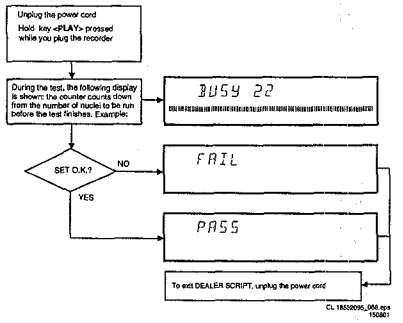


Figure 5-1

The End use/Dealer script executes all diagnostic nuclei that do not need any user interaction and are meaningful on a standalone DVD recorder. The nuclei called in the End user/ Dealer script are the following:

Counter	Nucleus	Name	Description
22	104	HostdSdramWrR	checks all memory locations of the 4MB SDRAM
21	106	HostdDramWrR	checks all the DRAM connected to the microprocessor of the digital board
20	123	Hostdl2cNvram	checks the data line (SDA) and the clock line (SCL) of the I2C bus between the host decoder and NVRAM
19	202	SAA7118I2c	checks the interface between the Host I2C controller and the AVENC SAA7118 Video Input Processor
18	200	VideoEncI2c	checks the interface between the host I2C controller and Empress SAA6752
17	207	AudioEncI2c	checks the I2C connection between the host decoder and Empress SAA6752
16	204	AudioEncAccess	tests the HIO8 interface lines between the host decoder and the audio encoder
15	203	AudioEncSramAccess	checks the access of the SRAM by the audio encoder (address and data lines).
14	205	AudioEncSramWrR	tests the SRAM connected to the audio encoder
13	206	AudioEncInterrupt	tests the interrupt line between the host decoder and the audio encoder
12	300	VsmAccess	checks whether the VSM interrupt controllers and DRAM are accessible
11	303	VsmInterrupt	checks both interrupt lines between the VSM and the host decoder
10	302	VsmSdramWrR	tests the entire SDRAM of the VSM
9	1400	Clock11_289MHz	switches the A_CLK of the micro clock to 11.2896 MHz
8	1401	Clock12_288MHz	switches the A_CLK of the micro clock to 12.288 MHz
7	601	BeS2Bengine	checks the S2B interface with the Basic Engine by sending an echo command
6	500	DisplayEcho	checks the interface between the host processor and the slave processor on the display board
5	700	AnalogueEcho	checks the interface between the host processor and the microprocessor on the analogue board
4	711	AnalogueNvram	checks the NVRAM on the analogue board
3	706	AnalogueTuner	checks whether the tuner on the analogue board is accessible
2	901	LoopAudioUserDealer	This nucleus tests the components on the audio signal path The host decoder - The analogue board - The audio encoder - The VSM On the analogue board the audio is internally looped back to the digital board
1	906	LoopVideoUserDealer	Nucleus for testing the components on the video signal system path: - The VIP - The video encoder - The VSM - The host decoder - The analogue board On the analogue the video signal is internally routed back to the digital board.

5.2 Player Script Interface

5.2.1 Description

The Player script will give the opportunity to perform a test that will determine which of the DVD recorder's modules are faulty, to read the error log and to perform an endurance loop test. To successfully perform the tests, the DVD recorder must be connected to a TV set.
To be able to check results of certain nuclei, the player script expects some interaction of the user (i.e. to approve a test picture or a test sound). Some nuclei (e.g. nuclei that test functionality of the DVDR module) require that a DVD+RW disc is inserted.
Only tests within the scope of the diagnostic software will be executed hence only faults within this scope can be detected.

5.2.2 Structure of the Player Script

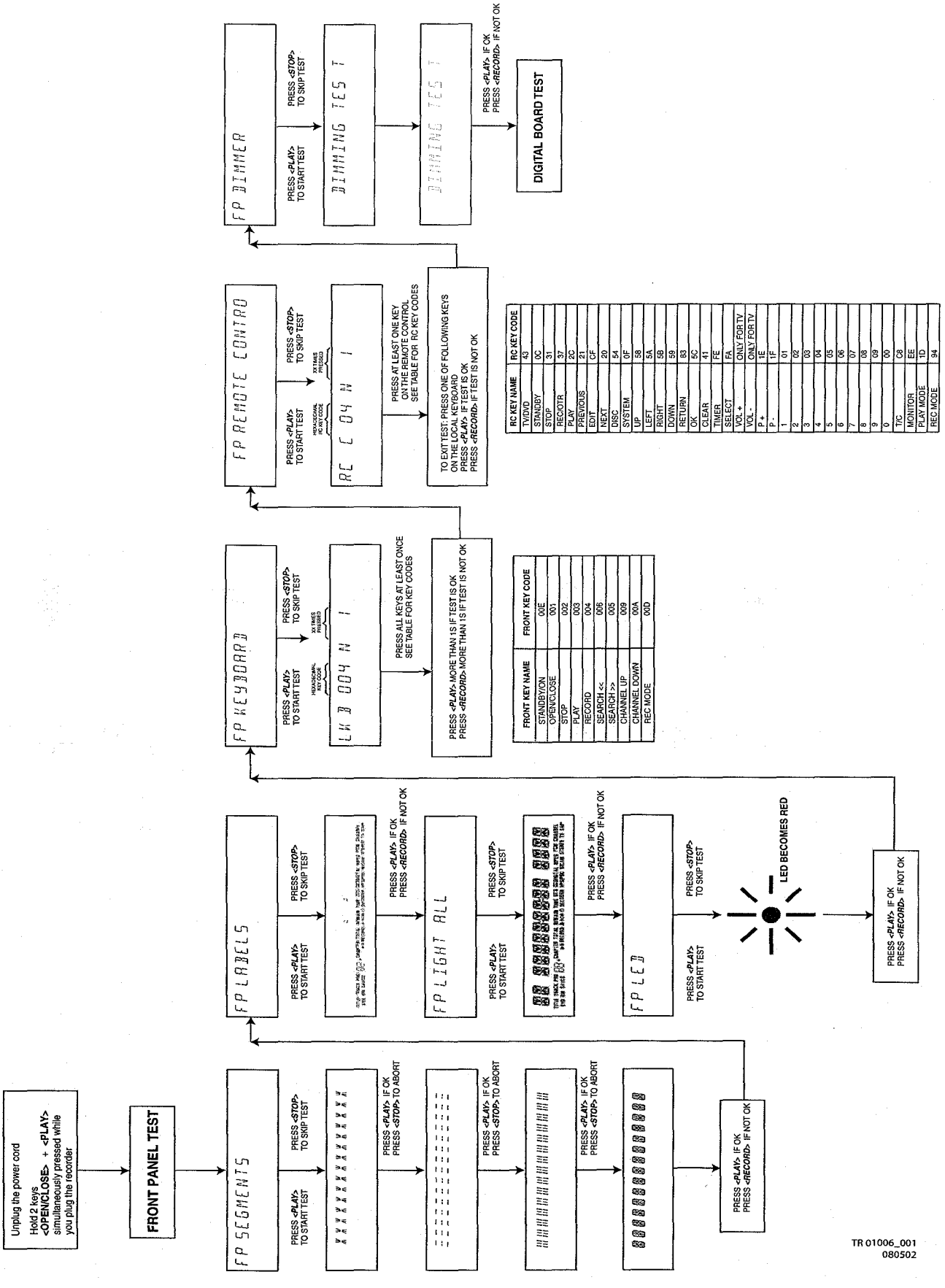
The player script consists of a set of nuclei testing the hardware modules in the DVD recorder: the Display PWB, the Digital PWB, the Analogue In/Out PWB and the DVDR module.
Nuclei run by the player test need some user interaction; in the next table this interaction is described. The player test is done in two phases:

- Interactive tests: this part of the player test depends strongly on user interaction and input to determine nucleus results and to progress through the full test. Reading the error log information can be useful to determine any errors that occurred recently during normal operation of the DVD player.
- The loop test will perform the same nuclei as the dealer test, but it will loop through the list of nuclei indefinitely.

STEP	DESCRIPTION	NUCLEUS
1	Press **OPEN/CLOSE** and **PLAY** at the same time and POWER ON the recorder to start the playerscript	2
2	The local display shows **FPSEGMENTS**. Press **PLAY** to start the test. First the *starburst pattern* is lit, then the *horizontal segments* are lit, followed by the *vertical segments* and the last test is *light all segments* test. After each of the 4 tests the user has to confirm that the correct pattern was lit. Press **PLAY** to confirm that the correct pattern was lit (four times if the FPSEGMENTS test was successful). Press **RECORD** to indicate that the correct pattern was not successfully lit. Press **STOP** to skip this nucleus.	502
3	The local display shows **FPLABELS**. Press **PLAY** to start the test. Press **PLAY** to confirm that all labels are lit. Press **RECORD** to indicate that not all labels are lit. Press **STOP** to skip this nucleus.	503
4	The local display shows **FPLIGHT ALL**. Press **PLAY** to start the test. Press **PLAY** to confirm that everything was lit. Press **RECORD** to indicate that not all patterns are lit. Press **STOP** to skip this nucleus.	520
5	The local display shows **FPLED**. Press **PLAY** to start the test. Press **PLAY** to confirm that the led is lit. Press **RECORD** to indicate that the led is not lit. Press **STOP** to skip this nucleus.	504
6	The local display shows **FPFLAP OPEN**. Press **PLAY** to start the test. Press **PLAY** to confirm that the flap has opened. Press **RECORD** to indicate that the flap did not open. Press **STOP** to skip this nucleus.	522
7	The local display shows **FPKEYBOARD**. Press **PLAY** to start the test. Attention all keys have to be pressed to get a positive result! Press **PLAY** for more than one second to confirm that all the keys were pressed and shown on the local display. If not all the keys were pressed, a FAIL message will appear on the local display. Press **RECORD** for more than one second to indicate that not all keys were pressed and shown on the local display. Press **STOP** for more than one second to skip this nucleus.	505
8	The local display shows **FPREMOTE CONTROL**. Press **PLAY** to start the test. Press **PLAY** to confirm that a key on the remote control was pressed and shown on the local display. Only one key has to be pressed to get a successful result. Press **RECORD** to indicate that the key on the remote control was pressed but not shown on the local display. Press **STOP** to skip this nucleus.	506
9	The local display shows **FPDIMMER**. Press **PLAY** to start the test. Press **PLAY** to confirm that the text on the local display was dimmed. Press **RECORD** to indicate that the text on the local display was not dimmed. Press **STOP** to skip this nucleus.	518
10	The local display shows **FPBEEPER**. Press **PLAY** to start the test. Press **PLAY** to confirm that the beeper on the front panel sounded. Press **RECORD** to indicate that the beeper on the front panel did not sound. Press **STOP** to skip this nucleus.	514
11	The local display shows **FPFLAP CLOSE**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	523
12	The local display shows **ROUTE VIDEO**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	712
13	The local display shows **ROUTE AUDIO**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	713
14	The local display shows **COLOUR-BAR ON**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	120

STEP	DESCRIPTION	NUCLEUS
15	The local display shows **PINK NOISE ON**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	115
16	The local display shows **PINK NOISE OFF**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	116
17	The local display shows **SINE ON**. Press **PLAY** to start the test. Press **STOP** to stop the sine. Press **STOP** to skip this nucleus.	117
18	The local display shows **COLOUR-BAR OFF**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	121
19	The local display shows **BERESET**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	603
20	The local display shows **BETRAY OPEN**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	616
21	The local display shows **BETRAY CLOSE**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	615
22	The local display shows **BEWRITE READ**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	617
23	The local display shows **BETRAY OPEN**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	616
24	The local display shows **BETRAY CLOSE**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus.	615
25	The local display shows **READ ERRORLOG**. Press **PLAY** to start the test. Press **STOP** to skip this nucleus. If the player test succeeded, the user/dealer script will start in an endless loop. If the player test failed, the local display will display FAIL and the error code	633

Remark
In case of failure, the display shows " FAIL XXXXXX ". The description of the shown error code can be retrieved in the survey of Nuclei Error Codes (paragraph 5.4). Once an error occurs, it is not possible to continue the player script. Unplug the set and restart the player script. By pressing the STOP key, it is possible to jump over the failure and to continue the player script.



FRONT KEY NAME	FRONT KEY CODE
STANDBY/ON	00E
OPEN/CLOSE	001
STOP	002
PLAY	003
RECORD	004
SEARCH <<	006
SEARCH >>	005
CHANNEL UP	009
CHANNEL DOWN	00A
REC MODE	00D

RC KEY NAME	RC KEY CODE
TV/DVD	43
STANDBY	0C
STOP	31
REC/OTR	37
PLAY	2C
PREVIOUS	21
EDIT	CF
NEXT	20
DISC	54
SYSTEM	0F
UP	58
LEFT	5A
RIGHT	5B
DOWN	59
RETURN	83
OK	5C
CLEAR	41
TIMER	FE
SELECT	FA
VOL +	ONLY FOR TV
VOL -	ONLY FOR TV
P +	1E
P -	1F
1	01
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
0	00
T/C	C8
MONITOR	EE
PLAY MODE	1D
REC MODE	94

Figure 5-2

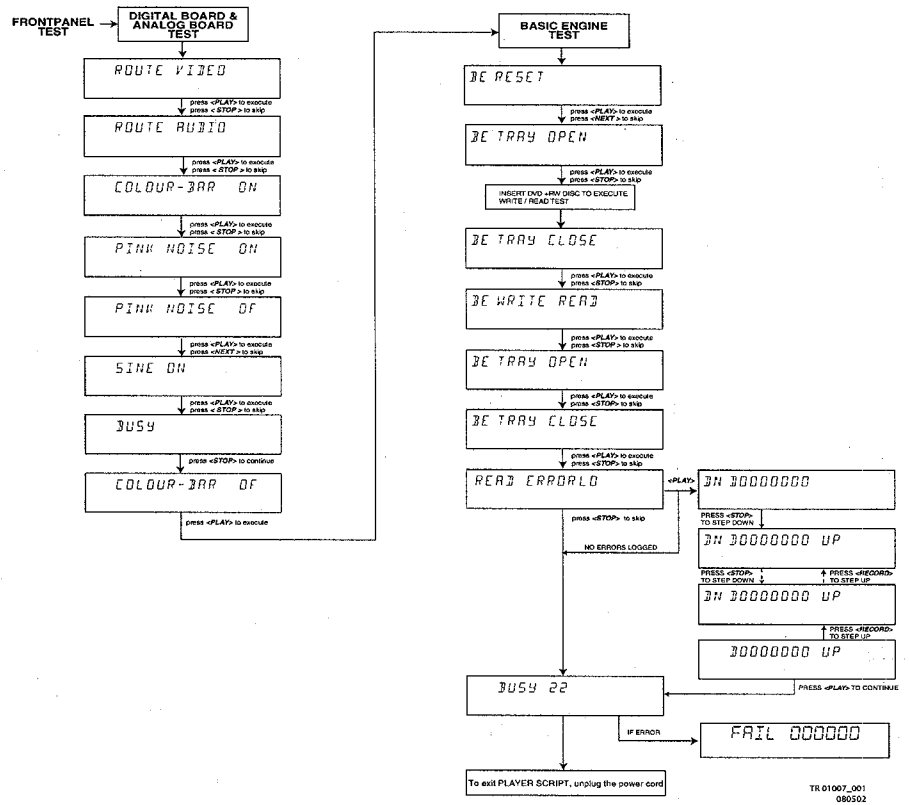


Figure 5-3

5.2.3 Error Log

Explanation:

The application errors will be logged in the NVRAM. The maximum number of error bytes that will be visible is 19. The last reported error is shown as DN D0000000, the oldest visible error as D0000000 UP and the errors in between as DN D0000000 UP. DN stands for DOWN, UP stands for UPWARDS. The shown
D error codes are identical to the Nuclei Error Codes (paragraph 5.4).

5.2.4 Trade Mode

TRADE MODE

When the recorder is in Trade Mode, the recorder cannot be controlled by means of the front key buttons, but only by means of the remote control.

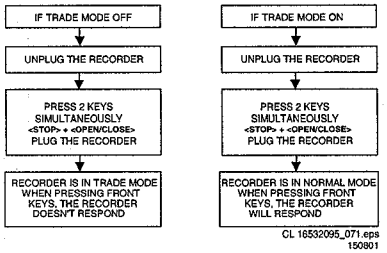


Figure 5-4

5.2.5 Virgin mode

If you want that the recorder starts up in Virgin mode, follow this procedure:

- Unplug the recorder
- plug the recorder again while you keep the STAND BY/ON key pressed
- the set starts up in Virgin mode.

5.3 Menu and Command Mode Interface

5.3.1 Nuclei Numeration

Each nucleus has a unique number of four digits. This number is the input of the command mode.

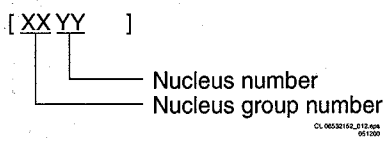


Figure 5-5

The following groups are defined:

Group number	Group name
0	Basic / Scripts
1	Host decoder (Sti5505 and memory)
2	Audio / video encoder (DVDR only)
3	VSM (DVDR only)
4	NVRAM
5	Front Panel
6	Basic Engine
7	Analogue board (DVDR only)
8	DVIO (DVDR only)
9	Loop nuclei (DVDR only)
10	Library sub nuclei (I2C nuclei)
11	User interface
12	Furore (SACD only)
13	DAC (SACD only)
14	Miscellaneous

5.3.2 Error Handling

Each nucleus returns an error code. This code contains six numerals, which means:

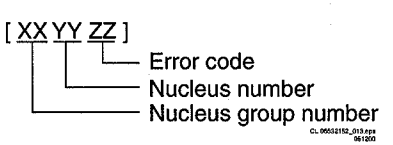


Figure 5-6

The nucleus group numbers and nucleus numbers are the same as above.

5.3.3 Command Mode Interface

Set-Up Physical Interface Components

Hardware required:

- Service PC
- one free COM port on the Service PC
- special cable to connect DVD recorder to Service PC

The service PC must have a terminal emulation program (e.g. OS2 WarpTerminal or Procomm) installed and must have a free COM port (e.g. COM1). Activate the terminal emulation program and check that the port settings for the free COM port are: 19200 bps, 8 data bits, no parity, 1 stop bit and no flow control. The free COM port must be connected via a special cable to the RS232 port of the DVD recorder. This special cable will also connect the test pin, which is available on the connector, to ground (i.e. activate test pin).
Code number of PC interface cable: 3122 785 90017

Activation

Plug the recorder to the mains and the following text will appear on the screen of the terminal (program):

```
DVD Video Recorder Diagnostic Software version 48
Basic SDRAM Data bus test passed
Basic SDRAM Address bus test passed
Basic SDRAM Device test passed

(M) enu, (C) ommand or (S) 2B-interface?     [M] : e C ↵
DD:>
```

CL 16532095_073.eps
150801

Figure 5-7

The first line indicates that the Diagnostic software has been activated and contains the version number. The next lines are the successful result of the SDRAM interconnection test and the basic SDRAM test. The last line allows the user to choose between the three possible interface forms. If pressing C has made a choice for Command Interface, the prompt ("DD>") will appear. The diagnostic software is now ready to receive commands. The commands that can be given are the numbers of the nuclei.

Command Overview
We provide an overview of the nuclei and their numbers. This overview is preliminary and subject to modifications.

Host Decoder [01]

[xx yy] Number	Nuclei
100	Checksum Flash
101	Flash Write Access 1
102	Flash Write Access 2
103	Flash Write Read
104	SdRam Write Read
105	SdRam Write Read Fast
106	Dram Write Read
107	Dram Write Read Fast
108	Hardware Version
109	Mute On
110	Mute Off
115	Pink Noise On
116	Pink Noise Off
117	Sine On
118	Sine Burst 1kHz
119	Sine Burst 12kHz
120	Colour-bar On Note: Use nuclus 712 with parameter 07 to route the signals to the analogue board output
121	Colour-bar Off
122	NvramWrR
123	Nvraml2c
130	Boot Version
131	Application Version
132	Diagnostics Version
133	Download Version
134	Write / read I2C message to / from digital board
135	Video Test Signal OnNote: Use nuclus 712 with parameter 07 to route the signals to the analogue board output. Input: 135 [a] [b] a: Number of test image, 0. Horizontal colour-bar 1. White 2. Yellow 3. Light blue 4. Green 5. Magenta 6. Red 7. Blue 8. Black 9. Colour triangle (execution time is 12 seconds) 10. Test image for progressive scan (execution time is 6 seconds) b: Video standard, 0. PAL BDGHI 1. NTSC
136	Video Test Signal Off
137	Macrovision Off

Audio Video Decoder [02]

[xx yy] Number	Nuclei
200	Video Encoder I2C
202	SAA7118 I2C
203	Audio Encoder SRAM Access
204	Audio Encoder Access
205	Audio Encoder SRAM Write Read
206	Audio Encoder Interrupts
207	Audio Encoder I2C
208	SAA7118 select input
209	Empress Version

VSM [03]

[xx yy] Number	Nuclei
300	Register Access
301	SDRAM Access
302	SDRAM Write Read
303	Interrupt lines
304	VSM Interconnection
305	UART

NVRAM [04]

[xx yy] Number	Nuclei
400	Reset
401	Read
402	Modify
403	UniqueNr Read
404	Read Error Log
407	Reset Error Log
409	Line2 Region-Code Reset
410	UniqueNr Store

Front Panel [05]

[xx yy] Number	Nuclei
500	Echo
501	Version
502	Segment
503	Label
504	Led
505	Keyboard
506	Remote-Control
507	Segment Starburst
508	Segment Vertical
509	Segment Horizontal
514	Beeper
515	Discbar
516	Discbar Dots
517	Vu / Grid
518	Dimmer
519	Blinking
520	Light All Segments
522	Flap Open
523	Flap Close

Basic Engine [06]

[xx yy] Number	Nuclei
600	S2B Pass
601	S2B Echo
602	Version
603	Reset
604	Focus On
605	Focus Off
606	Disc Motor On
607	Disc Motor Off
608	Radial On

[xx yy] Number	Nuclei
609	Radial Off
615	Tray In
616	Tray Out
617	Write Read
618	Write Read Endless Loop
619	Selftest
620	BE Test
621	Laser Test
622	Spindle (Disc) Motor Test
623	Focus Test
624	Sledge Motor Test
625	Sledge Motor Slow
626	Tilt
627	EEPROM Read
628	EEPROM Write
629	Optimise Jitter
630	Radial ATLS Calibration
631	Get Statistics Information
632	Reset Statistics Information
633	BE Read Error Log
634	BE Reset Error Log
638	Get Self Test Result
639	Radial Initialisation
640	Get OPU info

Analog Board [07]

[xx yy] Number	Nuclei
700	Echo
703	Boot Version
704	Hardware Version
705	Clock Adjust
706	Tuner
707	Frequency Download
708	Data Slicer
709	Sound Processor
710	AV Selector
711	Nvram
712	Route Video
713	Route Audio
715	Set Slash Version
716	Application Version
717	Diagnostics Version
718	Download Version
720	Bargraph Level Adjustment
721	Clock correction
722	Clock reference
723	Re-virginise Recorder
724	Flash Checksum
725	Tuner frequency selection Europe: To make video and audio signals from the tuner available on Scart2, send command "712 08". For Nafta/Apac: To make the black/white Video available on Y/C Rear Out connector, send command "712 08" Input: 725 [frequency in MHz*16] [system] System: NTSC=16, PAL BG=16, PAL I=32, PAL DK=48, SEC L=64, SEC LS=80, SEC BG=96, SEC DK=112
727	Set virgin bit
728	Clear Virgin Bit
729	Write / read I2C message to / from analogue board
730	Store external presets
731	Get slash version
732	AFC Reference Voltage Tuner

DVIO [08]

[xx yy] Number	Nuclei
800	Check DVIO board presence
801	Reset DVIO
802	DVIO Access
803	Get DVIO error codes
804	Get DVIO module Ids
805	Execute DVIO module SelfTestInput: 805 [a] [b]Parameters: a=1/0...full Ram test, b=1/0...cable connected
806	Set DVIO led on.
807	Set DVIO led off.

Loop Nuclei [09]

[xx yy] Number	Nuclei
900	Digital Audio Loop(no function in Gen. 1.5 and Lead)
901	User / Dealer Audio Loop
902	Digital Video Loop
903	Digital Video VBI Loop
904	System Video Loop
905	System Video VBI Loop
906	User / Dealer Video Loop
907	User / Dealer Video VBI Loop
908	System Audio Loop SCART
909	System Audio Loop CINCH
910	Digital DVIO Video Loop
911	System Video Vip

Miscellanious [14]

[xx yy] Number	Nuclei
1400	Clock 11.289 MHz
1401	Clock 12.288 MHz
1412	Progressive Scan I2C
1413	Progressive Scan test image on
1414	Progressive Scan test image off
1415	Progressive Scan Route Enable
1416	Progressive Scan Route Disable

Scripts [00]

[xx yy] Number	Nuclei
1	UserDealer Script
2	Player Script

Routing Audio and Video

Route Video
Nucleus Number: 712
Description
This nucleus routes the video signals on the analogue board to the destination determined by the input parameters

The paths that are available for video routing and their description(Europe version):

Path ID	Description
00	Input signal is VIDEO(CVBS) from digital board and will be re-routed back to the digital board.
01	Input signal is from FRONT VIDEO(CVBS) IN and will be routed to the digital board.
02	No Routing.
03	Input signal is from FRONT S-VIDEO(Y/C) and will be routed to the digital board.
04	No Routing.
05	Input signal is CVBS from SCART1 and will be routed to the digital board.
06	Input signal is CVBS from SCART2 and will be routed to the digital board.
07	Input Signal is CVBS from Digital Board and it will be routed to Scart1 and Scart2.
08	Input signal is VIDEO(CVBS) from ANTENNA IN and will be routed to SCART2.
09	Input signal is VIDEO(CVBS) from SCART1 and will be routed to SCART2.
10	Input signal is VIDEO(CVBS) from SCART2 and will be routed to SCART1.
11	Signal path is routed Fast Blank from Scart2 pin16 and will be routed Scart1 pin16
12	Input Signal is YC from Digital Board and it will be routed to Scart1.
13	No Routing.
14	No Routing.
15	Input Signal is CVBS from TUNER and it will be routed to Digital .
16	No Routing.
17	Input Signal is routed from digital board YC to REAR S-VIDEO(YC) OUT
18	Signal path is routed from digital board RGB to RGB SCART1 and from digital board CVBS to digital board CVBS.
19	No Routing.
20	Input RGB Signal is routed from Digital Board to SCART1(RGB),Input CVBS Signal from Digital Board to Digital Board and Fast Blanking Signal from Scart 2 to Scart1.
21	Input Y/C Signal from Digital Board is routed to Rear Y/C Connector and Input Y/c Signal from Front Y/C connector is routed to Digital Board.

The paths that are available for video routing and their description (Nafta region):

PATH ID	DESCRIPTION
00	Input signal is VIDEO(CVBS) from digital board and will be re-routed back to the digital board.A Cinch Cable need to be connected from Rear Cinch Out to Front Cinch In for this Test.(Direct routing on analogue board from YUV In to YUV Out is not Possible)
01	Input signal is from FRONT VIDEO(CVBS) IN and will be routed to the digital board.This routing is same as the above path id.
02	Input signal is from REAR VIDEO(CVBS) IN and will be routed to the digital board.
03	Input signal is from FRONT S-VIDEO(Y/C) IN and the signal received will be routed to the digital board.
04	Input signal is from REAR S-VIDEO(Y/C) IN and will be routed to the digital board.
05	No Routing.
06	No Routing.
07	No Routing.
08	Input signal is VIDEO(CVBS) from TUNER and will be routed to Y Pin of Rear Y/C Connector.This will give only black/White Picture .
09	Input signal is from YUV IN and will be routed to YUV OUT.This is possible only if Digital Board routes back YUV signal received back to the Analogue board(DENC)
10	No Routing.
11	No Routing.
12	No Routing.
13	No Routing.
14	No Routing
15	Input CVBS Signal from Tuner is routed to Digital Board..
16	No Routing
17	Input RGB Signal is routed from Digital Board to RGB Rear Out and Input CVBS Signal is routed from Rear Cinch In 1 to Digital Board(This second step is for routing Input CVBS Signal from Digital Board to Digital Board again - A Cinch cable need to be connected from Rear Cinch Out1 to Rear Cinch In 1)
18	Input Signal from CVBS Rear In is routed to Digital Board.This is same as path id 02.
19	Input Y/C signal from Digital Board is routed to Y/C Rear Out Connector and Input signal from Y/C Rear In Connector is routed to Y/C Digital Board.

23	The Video signal received from the Digital board will be outputted on Modulator channel 3. Please use command 120 for testing Video because Nuclei 120 will generate the Colour Bar signal on the digital Board.
24	The Audio signal received from the Digital board will be outputted on Modulator channel 4. Please use command 120 for testing Video because Nuclei 120 will generate the Colour Bar signal on the digital Board.

Example
DD:> 712 01
71200: Video routing on the Analogue Board OK.
Test OK @

Description
This nucleus routes the audio on the analogue board to the destination determined by the input parameters
The paths that are available for audio routing and their description (Europe version)

Route Audio
Nucleus Number: 713

PATH ID	DESCRIPTION
00	No Routing.
01	Input signal is from FRONT AUDIO IN and will be routed to the digital board.
02	Input signal is from REAR AUDIO IN 2 and will be routed to the digital board.
03	Input Audio Signal is routed from FRONT Cinch In to Digital Board.(This is same as path id 01)
04	Input Signal is from Rear Cinch In1 and it will be routed to Digital Board..
05	No routing.
06	No routing.
07	No routing.
08	No Routing.
09	No routing.
10	No Routing.
11	No Routing.
12	No Routing.
13	Input Signal is from Digital Board and it will be routed to the digital board.
14	No routing.
15	Input is Audio Signal from TUNER and it will be routed to Digital Board.
16	Input signal is AUDIO from dvio board and will be routed to Digital Board.
17	No routing.
18	No routing.
19	No routing.
20	Input signal is from REAR AUDIO IN 2 and will be routed to the digital board.
21	Input signal is from REAR AUDIO IN 1 and will be routed to the digital board.
22	Input signal is from REAR AUDIO IN 1 and will be routed to the digital board.
23	The Audio signal received from the Digital board will be outputted on Modulator channel 3. Please use command 117 for testing audio because Nuclei 117 will generate the Audio signal on the digital Board.
24	The Audio signal received from the Digital board will be outputted on Modulator channel 4. Please use command 117 for testing audio because Nuclei 117 will generate the Audio signal on the digital Board.

EXAMPLE
DD:> 713 00
71300: Audio routing on the Analogue Board OK.
Test OK @

5.3.4 Menu Mode Interdace

Activation

Plug the recorder to the mains and the following text will appear on the screen of the terminal (program):

```
DVD Video Recorer Diagnostic Software version 48
Basic SDRAM Data bus test passed
Basic SDRAM Address bus test passed
Basic SDRAM Device test passed

(M) enu, (C) ommand or (S) 2B-interface?     [M] : @ M ↵

Main Menu

1.   Digital Board            ->
2.   Analogue Board           ->
3.   Front Panel              ->
4.   Basic Engine             ->
5.   DVIO                     ->
6.   Progressive Scan Board   ->
7.   Loop tests               ->
8.   Log                      ->
9.   Scripts                  ->

Select>
```

Figure 5-8

The first line indicates that the Diagnostic software has been activated and contains the version number. The next lines are the successful result of the SDRAM interconnection test and the basic SDRAM test. The last line allows the user to choose between the three possible interface forms. If pressing M has made a choice for Menu Interface, the Main Menu will appear.

Menu Structure

The following menu structure is given after starting up the DVD recorder in menu mode. The symbol -> indicates that the current menu choice will invoke the display of a submenu.

Main Menu
1.Digital Board ->
2.Analogue Board ->
3.Front Panel ->
4.Basic Engine ->
5.DVIO ->
6.Progressive Scan Board ->
7.Loop Tests ->
8.Log ->
9.Scripts ->

Digital Board Menu
1.Host Decoder ->
2.VSM ->
3.AVENC ->
4.NVRAM ->

Host Decoder Menu
1.Flash Checksum
2.Flash1 Write Access
3.Flash2 Write Access
4.Flash Write/Read
5.Host SDRAM Write/Read
6.Host SDRAM Fast Write/Read
7.Host DRAM Write/Read
8.Host DRAM Fast Write/Read
9.I2C NVRAM
10.NVRAM Write/Read
11.Engine S2B Echo
12.Versions ->
13.Audio Mute ->
14.Colourbar ->
15.Pink Noise ->
16.Sine Generate ->

Digital Board Versions Menu
1.Hardware Version
2.Bootcode version
3.Applications Version
4.Diagnostics Version
5.Download Version

Audio Mute Menu
1.Audio Mute On
2.Audio Mute Off

Colourbar Menu
1.Colourbar On
2.Colourbar Off

Pink Noise Menu
1.Pink Noise On
2.Pink Noise Off

Sine Generate Menu
1.Sine On
2.Sine Burst 1kHz
3.Sine Burst 12kHz

VSM Menu
1.Register Access
2.SDRAM Access
3.VSM SDRAM Write/Read
4.Interrupt Lines
5.VSM Interconnection
6.UART

AVENC Menu
1.Empress ->
2.Video Input Processors ->

Empress Menu
1.Version number

Video Input Processors Menu
1.SAA7118 I2C Access

NVRAM Menu
1.Read Error Log
2.Reset Error Log
3.Read DVIO Unique ID

Analogue Board Menu
1.Echo
2.Obsolete
3.Route Video Input back to Digital board
4.Route Audio Input back to Digital board
5.Flash Checksum
6.Versions ->
7.Components ->
8.Re-virginize Recorder ->

Analogue Board Versions Menu
1.Hardware Version
2.Bootcode version
3.Application version
4.Diagnostics version
5.Download version

Analogue Components Menu
1.Tuner
2.Data Slicer
3.Sound Processor
4.AV Selector
5.NVRAM

Analogue Board Re-virginize Menu
1.Re-virginize Recorder
2.Set Virgin-bit
3.Clear Virgin-bit
4.Store external presets

Front Panel Menu
1.Echo
2.Version
3.Flap Control ->
4.Segment Test ->
5.Light Labels
6.Led test
7.Keyboard test
8.Remote Control
9.Beep
10.Disc Bar
11.Disc Bar Dots
12.Vu Grid
13.Dimmer
14.Blink
15.Light All Segments

Flap Control Menu
1.Open Flap
2.Close Flap

Segment Test Menu
1.Starburst
2.Light Horizontal Segments
3.Light Vertical Segments
4.Light All Segments

Basic Engine Menu
1.Reset
2.S2B Pass-through
3.S2B Echo
4.Focus On
5.Focus Off
6.Version
7.Self Test
8.Get Self Test Result
9.Basic Engine Test
10.Laser Test
11.Focus Test
12.Tilt Test
13.Optimise Jitter
14.Statistics Info
15.Log ->
16.Spindle Motor ->
17.Radial ->
18.Sledge ->
19.Tray ->

Basic Engine Error Log
1.Read Error Log
2.Reset Error Log

Basic Engine Spindle Motor Menu
1.Spindle Motor On
2.Spindle Motor Off
3.Spindle Motor Test

Basic Engine Radial Menu
1.Radial On
2.Radial Off
3.Radial Initialisation
4.Radial ATLS Calibration

Basic Engine Sledge Menu
1.Sledge test
2.Sledge test slow

Basic Engine Tray Menu
1.Tray In
2.Tray Out

DVIO Menu
1.Check Presence
2.Reset
3.Access
4.Error Codes
5.Module Identifiers
6.Led ->

DVIO Led Menu
1.Led On
2.Led Off

Progressive Scan Board Menu
1.I2C Access
2.Test Image On
3.Test Image Off

Loop Tests Menu
1.Digital Board Loops ->
2.User/Dealer Loops ->
3.System Loops ->
4.Basic Engine Loops ->

Digital Board Loops Menu
1.Obsolete
2.Digital Video Loop
3.Digital Video Loop VBI

User/Dealer Loops Menu
1.User/Dealer Audio Loop
2.User/Dealer Video Loop
3.User/Dealer Video Loop VBI

System Loops Menu
1.System Video Loop
2.System Video Loop VBI
3.System Audio Loop SCART(EURO)
4.System Audio Loop CINCH (NAFTA)

Basic Engine Loops Menu
1.Basic Engine write read
2.Basic Engine write read endless loop

Log Menu
1.Read Error Log
2.Reset Error Log

Script Menu
1.User/Dealer Script
2.Player Script

5.4 Nuclei Error Codes

In the following table the error codes will be described.

Error Nr	Error String
10000	"Checksum is OK"
10001	"segment name Checksum doesn't match" or "segment name segment not found"
10100	""
10101	"FLASH 1 Write access test failed"
10200	""
10201	"FLASH 2 Write access test failed"
10300	""
10301	"FLASH write test failed"
10302	"FLASH write command failed"
10303	"FLASH write test done max. number of times"
10400	""
10401	"HostDec SDRAM Memory data bus test goes wrong."
10402	" HostDec SDRAM Memory address bus test goes wrong."
10403	" HostDec SDRAM Physical memory device test goes wrong."
10500	""
10501	" HostDec SDRAM Memory data bus test goes wrong."
10502	" HostDec SDRAM Memory address bus test goes wrong."
10503	" HostDec SDRAM Physical memory device test goes wrong."
10600	""
10601	"HostDec DRAM Memory data bus test goes wrong."
10602	"HostDec DRAM Memory address bus test goes wrong."
10603	"HostDec DRAM Physical memory device test goes wrong."
10700	""
10701	"HostDec DRAM Memory data bus test goes wrong."
10702	"HostDec DRAM Memory address bus test goes wrong."
10703	"HostDec DRAM Physical memory device test goes wrong."

Error Nr	Error String
10800	"Host Decoder version(cut) number: version number""Digital hardware version"
10801	"Can not find version in FLASH."
10900	""
10901	"Error muting audio"
11000	""
11001	"Error demuting audio"
11500	""
11501	"Init of I2C failed"
11502	"The selection of the clock source failed"
11504	"The demute of the audio failed"
11600	""
11601	"Init of I2C failed"
11602	"The mute of the audio failed"
11700	""
11701	"Init of I2C failed"
11702	"The muting of the audio failed"
11703	"The demute of the audio failed"
11704	"The selection of the clock source failed"
11707	"Setup of Front panel failed"
11708	"Sine on Front panel keyboard failed"
11800	""
11801	"Init of I2C failed"
11802	"The muting of the audio failed"
11803	"The demute of the audio failed"
11804	"The selection of the clock source failed"
11805	"Error cannot start VSM audio in port"
11900	""
11901	"Init of I2C failed"
11902	"The muting of the audio failed"
11903	"The demute of the audio failed"
11904	"The selection of the clock source failed"
11905	"Error cannot start VSM audio in port"
12000	""
12001	"Invalid input
12100	""
12200	""
12201	"I2C bus busy before start"
12202	"NVRAM access time-out"
12203	"No NVRAM acknowledge"
12204	"NVRAM time-out"
12205	"NVRAM Write/Read back failed"
12300	""
12301	"I2C bus busy before start"
12302	"NVRAM read access time-out"
12303	"No NVRAM read acknowledge"
12304	"NVRAM read failed"
13000	"Bootcode application version : bootversion"
13001	"Can not find version in FLASH."
13100	"Recorder application version : recorderversion"
13101	"Can not find version in FLASH."
13200	"Diagnostics application version : diagversion"
13201	"Can not find version in FLASH."
13300	"Download application version : downloadversion"
13301	"Can not find version in FLASH."
13700	""
13701	"Turning off MacroVision failed"
20000	""
20001	"I2C bus busy before start"
20002	"Video Encoder access time-out"
20003	"No acknowledge from Video Encoder"

Error Nr	Error String
20004	"No data send/received to or from Video Encoder"
20005	"SAA7118 VIP can not be initialised"
20200	""
20201	"I2C bus busy before start"
20202	"SAA7118 VIP access time-out"
20203	"No acknowledge from SAA7118 VIP"
20204	"No data received from SAA7118 VIP"
20300	""
20301	"Error audio encoder SRAM access cannot initialise I2C"
20302	"Error audio encoder SRAM access cannot reset DSP through I2C"
20303	"Error audio encoder SRAM access cannot download boot"
20304	"Error audio encoder cannot download test code"
20305	"Error audio encoder cannot obtain result of test"
20306	"Error audio encoder SRAM access stuck-at-zero data line "
20307	"Error audio encoder SRAM access stuck-at-one data line "
20308	"Error audio encoder SRAM access stuck-at-one address line "
20309	"Error audio encoder SRAM access address line address line x is connected to data line data line y"
20310	"Error audio encoder SRAM access address lines address line x and address line y are connected "
20311	"Error audio encoder SRAM access data lines data line x and data line y are connected "
20312	"Error audio encoder SRAM access illegal data received"
20400	""
20401	"Error audio encoder access cannot initialise I2C"
20402	"Error audio encoder access cannot reset DSP through I2C"
20403	"Error audio encoder accessing ICR register"
20404	"Error audio encoder access stuck-at-zero of data line "
20405	"Error audio encoder access stuck-at-one of data line "
20406	"Audio encoder access data lines data line x and data line y are interconnected "
20500	""
20501	"Error audio encoder SRAM WRR cannot initialise I2C"
20502	"Error audio encoder SRAM WRR cannot reset DSP through I2C"
20503	"Error audio encoder WRR cannot download boot"
20504	"Error audio encoder cannot download test code"
20505	"Error audio encoder SRAM WRR cannot obtain result of test"
20506	"Error audio encoder WRR SRAM stuck-at-zero data bit "
20507	"Error audio encoder WRR SRAM stuck-at-one data bit "
20508	"Error audio encoder WRR SRAM data lines data line x and data line y are connected"
20509	"Error audio encoder WRR SRAM illegal data received"
20600	""
20601	"Error audio encoder interrupt cannot initialise I2C"
20602	"Error audio encoder interrupt cannot reset DSP through I2C"
20603	"Error audio encoder cannot download test code"
20604	"Error occurred accessing VSM"
20605	"Audio encoder interrupt not received"

Error Nr	Error String
20606	"Error occurred while activating the encoder"
20607	"Error audio encoder interrupt cannot initialise empress"
20608	"Error occurred while getting interrupt reason"
20700	""
20701	"Error audio encoder I2C cannot reset DSP through I2C"
20702	"Error audio encoder cannot download boot"
20703	"Error audio encoder cannot download TEST code"
20704	"Error audio encoder I2C bus busy"
20705	"Error audio encoder I2C cannot write slave address"
20706	"Error audio encoder I2C no acknowledge received"
20707	"Error audio encoder I2C cannot send/receive data"
20708	"Error audio encoder received data through I2C was invalid"
20800	""
20801	"I2C access failed."
20802	"SAA7118 VIP can not be initialised."
20803	"Invalid input"
20900	"B1.B2. B3.B4. B5.B6. B7.B8. B9.B10. B11.B12."
20901	"Firmware download of EMPRESS failed"
20902	"I2C bus busy before start"
20903	"EMPRESS access time-out"
20904	"No acknowledge from the EMPRESS"
20905	"No data send to the EMPRESS"
20906	"No data received from the EMPRESS"
30000	""
30001	"VSM SDRAM Bank1 Memory databus test goes wrong."
30002	"VSM SDRAM Bank1 Memory addressbus test goes wrong."
30003	"VSM SDRAM Bank1 Physical memory device test goes wrong."
30004	" VSM SDRAM Bank2 Memory databus test goes wrong."
30005	" VSM SDRAM Bank2 Memory addressbus test goes wrong."
30006	" VSM SDRAM Bank2 Physical memory device test goes wrong."
30007	"VSM SDRAM Bank1 VSM interrupt register A has a -stuck at- error for value:"
30008	"VSM SDRAM Bank2 VSM interrupt register A has a -stuck at- error for value:"
30100	""
30101	"VSM SDRAM Bank1 Memory databus test goes wrong."
30102	"VSM SDRAM Bank1 Memory addressbus test goes wrong."
30103	"VSM SDRAM Bank1 Physical memory device test goes wrong."
30104	" VSM SDRAM Bank2 Memory databus test goes wrong."
30105	" VSM SDRAM Bank2 Memory addressbus test goes wrong."
30106	" VSM SDRAM Bank2 Physical memory device test goes wrong."
30200	""
30201	"VSM SDRAM Bank1 Memory databus test goes wrong."
30202	"VSM SDRAM Bank1 Memory addressbus test goes wrong."

Error Nr	Error String
30203	"VSM SDRAM Bank1 Physical memory device test goes wrong."
30204	" VSM SDRAM Bank2 Memory databus test goes wrong."
30205	" VSM SDRAM Bank2 Memory addressbus test goes wrong."
30206	" VSM SDRAM Bank2 Physical memory device test goes wrong."
30300	""
30301	"VSM interrupt register A has a -stuck at- error for value:"
30302	"VSM interrupt register B has a -stuck at- error for value:"
30303	"Interrupt A wasn't raised."
30304	"Interrupt B wasn't raised."
30305	"Interrupts A and B were raised."
30400	""
30401	"VSM SDRAM Bank1 Memory databus test goes wrong."
30402	"VSM SDRAM Bank1 Memory addressbus test goes wrong."
30403	"VSM SDRAM Bank1 Physical memory device test goes wrong."
30404	" VSM SDRAM Bank2 Memory databus test goes wrong."
30405	" VSM SDRAM Bank2 Memory addressbus test goes wrong."
30406	" VSM SDRAM Bank2 Physical memory device test goes wrong."
30500	""
30501	"Communication with the analogue board fails."
30502	"Echo test to analogue board returned wrong string."
40000	""
40001	"NVRAM Reset; I2C failed"
40100	"NVRAM address = 0xaddress -> Byte value = 0xvalue"
40101	"NVRAM Read; I2C failed"
40102	"NVRAM Read; Invalid input"
40200	""
40201	"NVRAM Modify; I2C failed"
40202	"NVRAM Modify; Invalid input"
40300	"DV Unique ID = id"
40301	"NVRAM Read DV Unique ID; I2C failed"
40400	"\r\n Error log:\r\n errorString \r\n Ó "
40401	"NVRAM error log; I2C failed"
40402	"NVRAM error log is invalid"
40403	"Front panel failed"
40700	""
40701	"NVRAM error log reset; I2C failed"
40900	"Region code Change counter is reset"
40901	"NVRAM region code reset; I2C failed"
41000	""
41001	"NVRAM Store DV Unique ID; I2C failed"
41002	"NVRAM Store DV Unique ID; Invalid input"
50000	""
50007	"Execution of the command on the analogue board failed."
50008	"The frontpanel could not be accessed by the analogue board."
50009	"The echo from the frontpanel processor was not correct."
50100	" Front panel version: FPversion "

Error Nr	Error String
50102	"Execution of the command on the analogue board failed."
50103	"The frontpanel could not be accessed by the analogue board."
50200	""
50204	"Execution of the command on the analogue board failed."
50205	"The frontpanel could not be accessed by the analogue board."
50206	"The frontpanel did not show a starburst."
50207	"The user skipped the FP-which pattern test."
50208	"The user returned an unknown confirmation: confirmation "
50209	"The frontpanel did not show horizontal segments."
50210	"The frontpanel did not show vertical segments."
50300	""
50304	"Execution of the command on the analogue board failed."
50305	"The frontpanel could not be accessed by the analogue board."
50306	"The frontpanel did not light all labels."
50307	"The user skipped the rest of the FP-label test."
50308	"The user returned an unknown confirmation: confirmation"
50400	""
50404	"Execution of the command on the analogue board failed."
50405	"The frontpanel could not be accessed by the analogue board."
50406	"The LED's could not be turned on."
50407	"The user skipped the rest of the FP-LED test."
50408	"The user returned an unknown confirmation: confirmation"
50500	""
50502	"Front panel Keyboard; test failed"
50503	"Front panel Keyboard; test aborted"
50504	"Front panel Keyboard; not all keys were pressed"
50505	"Front panel keyboard I2C connection failed"
50506	"Unable to get slashversion"
50600	""
50602	"Front panel Remote control; test failed"
50603	"Front panel Remote control; test aborted"
50604	"Front panel remote control; can not access FP"
50605	"Front panel remote control; no user input received"
50700	""
50701	"Execution of the command on the analogue board failed."
50702	"The frontpanel could not be accessed by the analogue board."
50703	"The frontpanel did not show a starburst."
50704	"The user skipped the FP-starburst test."
50705	"The user returned an unknown confirmation: confirmation "
50800	""
50801	"Execution of the command on the analogue board failed."
50802	"The frontpanel could not be accessed by the analogue board."
50803	"The frontpanel did not show vertical segments."
50804	"The user skipped the FP-vertical segments test."
50805	"The user returned an unknown confirmation: confirmation "
50900	""

Error Nr	Error String
50901	"Execution of the command on the analogue board failed."
50902	"The frontpanel could not be accessed by the analogue board."
50903	"The frontpanel did not show horizontal segments."
50904	"The user skipped the FP-horizontal segments test."
50905	"The user returned an unknown confirmation: confirmation "
51400	""
51401	"Execution of the command on the analogue board failed."
51402	"The frontpanel could not be accessed by the analogue board."
51403	"The beeper did not sound."
51404	"The user skipped the FP-Beep test."
51405	"The user returned an unknown confirmation: confirmation"
51500	""
51501	"Execution of the command on the analogue board failed."
51502	"The frontpanel could not be accessed by the analogue board."
51503	"The discbar did not display properly."
51504	"The user skipped the discbar test."
51505	"The user returned an unknown confirmation: confirmation"
51600	""
51601	"Execution of the command on the analogue board failed."
51602	"The frontpanel could not be accessed by the analogue board."
51603	"The discbar dots did not display properly."
51604	"The user skipped the discbar dots test."
51605	"The user returned an unknown confirmation: confirmation"
51700	""
51701	"Execution of the command on the analogue board failed."
51702	"The frontpanel could not be accessed by the analogue board."
51703	"The VU grid did not display properly."
51704	"The user skipped the VU gridtest."
51705	"The user returned an unknown confirmation: confirmation"
51800	""
51801	"Execution of the command on the analogue board failed."
51802	"The frontpanel could not be accessed by the analogue board."
51803	"The frontpanel could not be dimmed."
51804	"The user skipped the FP-Dim test."
51805	"The user returned an unknown confirmation: confirmation"
51900	""
51901	"Execution of the command on the analogue board failed."
51902	"The frontpanel could not be accessed by the analogue board."
51903	"The frontpanel did not show segments blinking."
51904	"The user skipped the FP-blinking test."
51905	"The user returned an unknown confirmation: confirmation"
52000	""

Error Nr	Error String
52001	"Execution of the command on the analogue board failed."
52002	"The frontpanel could not be accessed by the analogue board."
52003	"The frontpanel did not show all segments lit."
52004	"The user skipped the FP-light all segments test."
52005	"The user returned an unknown confirmation: confirmation"
52200	""
52201	"Communication with Analogue Board fails."
52202	"Frontpanel can not be accessed by the Analogue Board."
52300	""
52301	"Communication with Analogue Board fails."
52302	"Frontpanel can not be accessed by the Analogue Board."
60000	""
60100	""
60101	"Basic Engine returned error number 0xerrornumber"
60102	"Parity error from Basic Engine to Serial"
60103	"Communication time-out error"
60104	"Unexpected response from Basic Engine"
60105	"Echo loop could not be closed"
60106	"Wrong echo pattern received"
60200	"Version: nr1.nr2.nr3"
60201	"Basic Engine returned error number 0xerrornumber"
60202	"Parity error from Basic Engine to Serial"
60203	"Communication time-out error"
60204	"Unexpected response from Basic Engine"
60205	"Front Panel failed."
60300	""
60301	"Basic-Engine time-out error"
60400	""
60401	"Basic Engine returned error number 0xerrornumber"
60402	"Parity error from Basic Engine to Serial"
60403	"Communication time-out error"
60404	"Unexpected response from Basic Engine"
60405	"Focus loop could not be closed"
60500	""
60501	"Basic Engine returned error number 0xerrornumber"
60502	"Parity error from Basic Engine to Serial"
60503	"Communication time-out error"
60504	"Unexpected response from Basic Engine"
60600	""
60601	"Basic Engine returned error number 0xerrornumber"
60602	"Parity error from Basic Engine to Serial"
60603	"Communication time-out error"
60604	"Unexpected response from Basic Engine"
60700	""
60701	"Basic Engine returned error number 0xerrornumber"
60702	"Parity error from Basic Engine to Serial"
60703	"Communication time-out error"
60704	"Unexpected response from Basic Engine"
60800	""
60801	"Basic Engine returned error number 0xerrornumber"
60802	"Parity error from Basic Engine to Serial"

Error Nr	Error String
60803	"Communication time-out error"
60804	"Unexpected response from Basic Engine"
60805	"Radial loop could not be closed"
60900	""
60901	"Basic Engine returned error number 0xerrornumber"
60902	"Parity error from Basic Engine to Serial"
60903	"Communication time-out error"
60904	"Unexpected response from Basic Engine"
61500	""
61501	"Basic Engine returned error number 0xerrornumber"
61502	"Parity error from Basic Engine to Serial"
61503	"Communication time-out error"
61504	"Unexpected response from Basic Engine"
61600	""
61601	"Basic Engine returned error number 0xerrornumber"
61602	"Parity error from Basic Engine to Serial"
61603	"Communication time-out error"
61604	"Unexpected response from Basic Engine"
61700	""
61701	"BE tray-in command failed"
61702	"BE read-TOC command failed"
61703	"BE VSM interrupt initialisation failed"
61704	"BE set irq command failed"
61705	"BE no disc or wrong disc inserted"
61706	"BE rec-pause command failed"
61707	"BE VSM BE out DMA initialisation failed"
61708	"BE VSM BE out initialisation failed"
61709	"BE VSM BE out DMA start failed"
61710	"BE VSM BE out start failed"
61711	"BE rec command failed"
61712	"BE VSM out underrun error occurred"
61713	"BE record complete interrupt not raised"
61714	"BE get irq command failed"
61715	"BE no interrupt was raised by BE"
61716	"BE VSM DMA out not finished"
61717	"BE stop command after writing failed"
61718	"BE VSM Sector processor initialisation failed"
61719	"BE VSM sector processor DMA initialisation failed"
61720	"BE VSM sector processor DMA start failed"
61721	"BE VSM sector processor start failed"
61722	"BE seek command failed"
61723	"BE VSM sector processor error occurred"
61724	"BE read timeout occurred"
61725	"BE stop command after reading failed"
61726	"BE difference found in data at disc sector 0xdiscsector"
61727	"This nucleus cannot be executed because the Self-Test failed"
61800	""
61801	"BE i2c initialisation failed"
61802	"This nucleus cannot be executed because the Self-Test failed"
61900	""
61901	"The SelfTest failed with result: 0xnr1 0xnr2 0xnr3"
61902	"Basic Engine returned error number 0xerrornumber"
61903	"Parity error from Basic Engine to Serial"
61904	"Communication time-out error"

Error Nr	Error String
61905	"Unexpected response from Basic Engine"
62000	""
62001	"Self-Test : errorstring1 Laser-Test : errorstring2 SpindleM-Test: errorstring3 SledgeM-Test : errorstring4 Focus-Test : errorstring5"
62100	"The forward sense level is 0xlevel"
62101	"Basic Engine returned error number 0xerrornumber"
62102	"Parity error from Basic Engine to Serial"
62103	"Communication time-out error"
62104	"Unexpected response from Basic Engine"
62200	""
62201	"The BE-self-diagnostic-spindle-motor-test failed"
62202	"Basic Engine returned error number 0xerrornumber"
62203	"Parity error from Basic Engine to Serial"
62204	"Communication time-out error"
62205	"Unexpected response from Basic Engine"
62300	""
62301	"The BE-focus-test failed"
62302	"Basic Engine returned error number 0xerrornumber"
62303	"Parity error from Basic Engine to Serial"
62304	"Communication time-out error"
62305	"Unexpected response from Basic Engine"
62400	""
62401	"The BE-self-diagnostic-sledge-motor-test failed"
62402	"Basic Engine returned error number 0xerrornumber"
62403	"Parity error from Basic Engine to Serial"
62404	"Communication time-out error"
62405	"Unexpected response from Basic Engine"
62500	""
62600	""
62700	"BE EEPROM address = address -> Byte value = 0xvalue"
62701	"Basic Engine returned error number 0xerrornumber"
62702	"Parity error from Basic Engine to Serial"
62703	"Communication time-out error"
62704	"Unexpected response from Basic Engine"
62705	"BE read EEPROM; invalid input"
62800	""
62801	"Basic Engine returned error number 0xerrornumber"
62802	"Parity error from Basic Engine to Serial"
62803	"Communication time-out error"
62804	"Unexpected response from Basic Engine"
62805	"BE write EEPROM; invalid input"
62900	""
62901	"Basic Engine returned error number 0xerrornumber"
62902	"Parity error from Basic Engine to Serial"
62903	"Communication time-out error"
62904	"Unexpected response from Basic Engine"
62905	"Radial loop could not be closed"
63000	""
63001	"Basic Engine returned error number 0xerrornumber"
63002	"Parity error from Basic Engine to Serial"
63003	"Communication time-out error"
63004	"Unexpected response from Basic Engine"

Error Nr	Error String
63100	" Number of times Tray went Open/Closed : nr1"" Total hours the CD laser was on : nr2"" Total hours the DVD laser was on : nr3"" Total hours the write laser was on : nr4"
63101	"Basic Engine returned error number 0xerrornumber"
63102	"Parity error from Basic Engine to Serial"
63103	"Communication time-out error"
63104	"Unexpected response from Basic Engine"
63200	""
63201	"Basic Engine returned error number 0xerrornumber"
63202	"Parity error from Basic Engine to Serial"
63203	"Communication time-out error"
63204	"Unexpected response from Basic Engine"
63300	Momentary errors (Byte 1 - Byte 7) : 0xb1 0xb2 0xb3 0xb4 0xb5 0xb6 0xb7 Cumulative errors (Byte 1 - Byte 7): : 0xb1 0xb2 0xb3 0xb4 0xb5 0xb6 0xb7 Fatal errors (Oldest - Youngest) : : 0xb1 0xb2 0xb3 0xb4 0xb5
63301	"Basic Engine returned error number 0xerrornumber"
63302	"Parity error from Basic Engine to Serial"
63303	"Communication time-out error"
63304	"Unexpected response from Basic Engine"
63400	""
63401	"Basic Engine returned error number 0xerrornumber"
63402	"Parity error from Basic Engine to Serial"
63403	"Communication time-out error"
63404	"Unexpected response from Basic Engine"
63500	""
63501	"Basic Engine returned error number 0xerrornumber"
63502	"Parity error from Basic Engine to Serial"
63503	"Communication time-out error"
63504	"Unexpected response from Basic Engine"
63505	"errorstring ÖThe basic engine will reject all player commands"
63900	""
63901	"Basic Engine returned error number 0xerrornumber"
63902	"Parity error from Basic Engine to Serial"
63903	"Communication time-out error"
63904	"Unexpected response from Basic Engine"
64000	"BE OPU number = opunumber"
64001	"Basic Engine returned error number 0xerrornumber"
64002	"Parity error from Basic Engine to Serial"
64003	"Communication time-out error"
64004	"Unexpected response from Basic Engine"
64100	"The data was successfully written on and read from a DVD disc"
64101	"The tray-in command failed"
64102	"The read-TOC command failed"
64103	"The VSM interrupt initialisation failed"
64104	"The set irq command failed"
64105	"No disc or wrong disc inserted"
64106	"The rec-pause command failed"
64107	"The VSM BE out DMA initialisation failed"
64108	"The VSM BE out initialisation failed"
64109	"The VSM BE out DMA start failed"
64110	"The VSM BE out start failed"
64111	"The rec command failed"

Error Nr	Error String
64112	"The VSM out underrun error occurred"
64113	"The record complete interrupt was not raised"
64114	"The get irq command failed"
64115	"There was no interrupt raised by BE"
64116	"The VSM DMA did not finished"
64117	"The stop command after writing failed"
64118	"The VSM Sector processor initialisation failed"
64119	"The VSM sector processor DMA initialisation failed"
64120	"The VSM sector processor DMA start failed"
64121	"The VSM sector processor start failed"
64122	"The seek command failed"
64123	"The VSM sector processor error occurred"
64124	"The read timeout occurred"
64125	"The stop command after reading failed"
64126	"There was a difference found in data at a specific disc sector"
64127	"The result of the self test contains errors"
64128	"An error interrupt was raised by BE"
64129	"The calibrate-record command failed"
64130	"To many retries"
64131	"BE update RAI command after writing failed"
64132	"BE find first recordable address command failed"
64133	"DVD+R disc is full"
64200	""
64201	"BE i2c initialisation failed"
64202	"This nucleus cannot be executed because the Self-Test failed"
70000	"Echo test OK"
70001	"Echo test returned wrong string."
70002	"Communication with Analogue Board fails"
70300	"SoftwareVersion"
70301	"Can not find segment in FLASH ROM on the Analogue Board"
70302	"Communication with Analogue Board fails"
70400	"HardwareVersion"
70401	"Can not find segment in FLASH ROM on the Analogue Board"
70402	"Communication with Analogue Board fails"
70500	"Clock adjusted OK"
70501	"Can not adjust the clock on the Analogue Board."
70502	"Wrong date/time text size."
70503	"Communication with Analogue Board fails"
70600	"Tuner accessibility test OK"
70601	"Can not access tuner on the Analogue Board."
70602	"Communication with Analogue Board fails"
70700	"Frequency download OK"
70701	"Wrong frequency table size."
70702	"Can not download the frequency table into the analogue NVRAM."
70703	"Can not download the frequency table into the analogue NVRAM."
70704	"Communication with Analogue Board fails"
70800	"Data slicer test OK"
70801	"Test of the Data slicer on the Analogue Board fails."
70802	"Communication with Analogue Board fails"
70900	"Sound Processor test OK"
70901	"Test of the Sound Processor on the Analogue Board fails."
70902	"Communication with Analogue Board fails"
71000	"AV Selector test OK"

Error Nr	Error String
71001	"Test of the AV Selector on the Analogue Board fails."
71002	"Communication with Analogue Board fails"
71100	"NVRAM test OK"
71101	"Test of the NVRAM on the Analogue Board fails."
71102	"Communication with Analogue Board fails"
71200	"Video routing on the Analogue Board OK"
71201	"Routing the video on the Analogue Board fails."
71202	"Invalid input."
71203	"Communication with Analogue Board fails"
71300	"Audio routing on the Analogue Board OK"
71301	"Routing the audio on the Analogue Board fails."
71302	"Invalid input."
71303	"Communication with Analogue Board fails"
71500	""
71501	"Invalid slash version, default slash version is set."
71502	"Setting the slash version on the Analogue Board fails."
71503	"Communication with Analogue Board fails"
71600	"ApplicationVersion"
71601	"Can not find segment in FLASH ROM on the Analogue Board"
71602	"Communication with Analogue Board fails"
71700	"DiagnosticsVersion"
71701	"Can not find segment in FLASH ROM on the Analogue Board"
71702	"Communication with Analogue Board fails"
71800	"DownloadVersion"
71801	"Can not find segment in FLASH ROM on the Analogue Board"
71802	"Communication with Analogue Board fails"
72300	""
72000	""
72001	"Adjusting BarGraphLevel failed"
72002	"Communication with Analogue Board fails"
72100	""
72101	"Storing clock correction failed"
72102	"Value out of range : default value stored "
72103	"Invalid input."
72104	"Communication with Analogue Board fails"
72200	""
72201	"Initialising the 1Hz signal on the Clock IC failed"
72202	"Communication with Analogue Board fails"
72301	"Clearing the NVRAM on the Analogue Board fails"
72302	"Communication with Analogue Board fails"
72400	"segment checksum is : checksum which is correct" for every segment
72401	"segment could not be found" or "segment checksum is : checksumC ,however it should be : checksumE" for every segment
72402	"Communication with Analogue Board fails"
72900	"Date received"
72901	"Data returned"
72902	"Communication on I2C-bus failed on the Analogue Board fails."
72903	"Communication with Analogue Board fails"
73000	""
73001	"Storing the external presets on the Analogue Board fails"
73002	"Communication with Analogue Board fails"
73100	"0xslashversion" where slashversion is the slash version read from the analogue board
73101	"Error while reading out slash version."

Error Nr	Error String
73102	"I2C Write error."
73103	"I2C Read error."
73104	"Communication with Analogue Board fails"
73200	""
73201	"Storing the Reference Voltage for the Tuner failed"
73202	"Invalid input."
73203	"Communication with Analogue Board fails"
80000	"The DVIO module is present in the system."
80001	"The DVIO module is not present in the system."
80100	"The DVIO module has been reset OK."
80101	"The DVIO module is not present in the system."
80102	"The DVIO module could not be reset."
80103	"Could not initialise I2C before Reset."
80200	"The accessibility of the DVIO module is OK."
80201	"The DVIO board is not present in this DVDR."
80202	"Could not initialise I2C."
80203	"Unable to reset the DVIO module."
80204	"Unable to receive the reset indication from the DVIO module."
80205	"Unable to send the configuration to the DVIO module."
80206	"Unable to download the chip ID to the DVIO module."
80207	"Unable to set the mode of the DVIO module to IDLE."
80208	"Software Error in function HandleStateAwaitingReply !!"
80209	"Maximal number of retries reached by HandleStateSending !!"
80210	"Maximal number of retries (NACKs) reached (HandleStateSending)"
80211	"We tried to receive a reply for DVIO_MAX_RETRIES_ACKREPLY times !!"
80212	"We tried to receive a reply for DVIO_MAX_RETRIES_REPLY times !!"
80213	"We tried to receive an Ack for DVIO_MAX_RETRIES_ACK times!!"
80214	"VSM UART error timeout transmitting command"
80215	"VSM UART error timeout receiving reply"
80216	"VSM UART frame error occurred receiving from DVIO board"
80217	"VSM UART parity error occurred receiving from DVIO board"
80218	"The confirmation/indication from the DVIO module is invalid."
80300	"The accessibility of the DVIO module is OK."
80301	"The DVIO board is not present in this DVDR."
80302	"Could not initialise I2C."
80303	"Unable to reset the DVIO module."
80304	"Unable to receive the reset indication from the DVIO module."
80305	"Unable to send the configuration to the DVIO module."
80306	"Unable to download the chip ID to the DVIO module."
80307	"Unable to set the mode of the DVIO module to IDLE."
80308	"Software Error in function HandleStateAwaitingReply !!"
80309	"Maximal number of retries reached by HandleStateSending !!"
80310	"Maximal number of retries (NACKs) reached (HandleStateSending)"

Error Nr	Error String
80311	"We tried to receive a reply for DVIO_MAX_RETRIES_ACKREPLY times !!"
80312	"We tried to receive a reply for DVIO_MAX_RETRIES_REPLY times !!"
80313	"We tried to receive an Ack for DVIO_MAX_RETRIES_ACK times!!"
80314	"VSM UART error timeout transmitting command"
80315	"VSM UART error timeout receiving reply"
80316	"VSM UART frame error occurred receiving from DVIO board"
80317	"VSM UART parity error occurred receiving from DVIO board"
80318	"The confirmation/indication from the DVIO module is invalid."
80400	"The accessibility of the DVIO module is OK."
80401	"The DVIO board is not present in this DVDR."
80402	"Could not initialise I2C."
80403	"Unable to reset the DVIO module."
80404	"Unable to receive the reset indication from the DVIO module."
80405	"Unable to send the configuration to the DVIO module."
80406	"Unable to download the chip ID to the DVIO module."
80407	"Unable to set the mode of the DVIO module to IDLE."
80408	"Software Error in function HandleStateAwaitingReply !!"
80409	"Maximal number of retries reached by HandleStateSending !!"
80410	"Maximal number of retries (NACKs) reached (HandleStateSending)"
80411	"We tried to receive a reply for DVIO_MAX_RETRIES_ACKREPLY times !!"
80412	"We tried to receive a reply for DVIO_MAX_RETRIES_REPLY times !!"
80413	"We tried to receive an Ack for DVIO_MAX_RETRIES_ACK times!!"
80414	"VSM UART error timeout transmitting command"
80415	"VSM UART error timeout receiving reply"
80416	"VSM UART frame error occurred receiving from DVIO board"
80417	"VSM UART parity error occurred receiving from DVIO board"
80418	"The confirmation/indication from the DVIO module is invalid."
80500	""
80501	"The DVIO board is not present in this DVDR."
80502	"The I2C could not be initialised."
80503	"The DVIO module could not be reset."
80504	"Unable to receive the reset indication from the DVIO module."
80505	"Unable to send the configuration to the DVIO module."
80506	"Unable to download the chip ID to the DVIO module."
80507	"Unable to set the mode of the DVIO module to IDLE."
80508	"Software Error in HandleStateAwaitingReply function!"
80509	"Maximal number of retries reached by HandleStateSending!"
80510	"Maximal number of retries (NACK's) reached "(HandleStateSending)
80511	"We tried to receive a reply for DVIO_MAX_RETRIES_ACKREPLY times!"

Error Nr	Error String
80512	"We tried to receive a reply for DVIO_MAX_RETRIES_REPLY times!"
80513	"We tried to receive an Acknowledge for DVIO_MAX_RETRIES_ACK times!"
80514	"VSM UART error timeout transmitting command"
80515	"VSM UART error timeout receiving reply"
80516	"VSM UART frame error occurred receiving from DVIO board"
80517	"VSM UART parity error occurred receiving from DVIO board"
80518	"The confirmation/indication from the DVIO module is invalid."
80519	"Setting the DVIO module in/out diagnostics mode failed"
80520	"Invalid input"
80521	"Getting the errors of the self-test failed"
80522	"Self-test failed"
80600	""
80601	"The DVIO board is not present in this DVDR."
80602	"The I2C could not be initialised."
80603	"The DVIO module could not be reset."
80604	"Unable to receive the reset indication from the DVIO module."
80605	"Unable to send the configuration to the DVIO module."
80606	"Unable to download the chip ID to the DVIO module."
80607	"Unable to set the mode of the DVIO module to IDLE."
80608	"Software Error in HandleStateAwaitingReply function!"
80609	"Maximal number of retries reached by HandleStateSending!"
80610	"Maximal number of retries (NACK's) reached "(HandleStateSending)
80611	"We tried to receive a reply for DVIO_MAX_RETRIES_ACKREPLY times!"
80612	"We tried to receive a reply for DVIO_MAX_RETRIES_REPLY times!"
80613	"We tried to receive an Acknowledge for DVIO_MAX_RETRIES_ACK times!"
80614	"VSM UART error timeout transmitting command"
80615	"VSM UART error timeout receiving reply"
80616	"VSM UART frame error occurred receiving from DVIO board"
80617	"VSM UART parity error occurred receiving from DVIO board"
80618	"The confirmation/indication from the DVIO module is invalid."
80619	"Setting the DVIO module in/out diagnostics mode failed"
80700	""
80701	"The DVIO board is not present in this DVDR."
80702	"The I2C could not be initialised."
80703	"The DVIO module could not be reset."
80704	"Unable to receive the reset indication from the DVIO module."
80705	"Unable to send the configuration to the DVIO module."
80706	"Unable to download the chip ID to the DVIO module."
80707	"Unable to set the mode of the DVIO module to IDLE."
80708	"Software Error in HandleStateAwaitingReply function!"

Error Nr	Error String
80709	"Maximal number of retries reached by HandleStateSending!"
80710	"Maximal number of retries (NACK's) reached "(HandleStateSending)
80711	"We tried to receive a reply for DVIO_MAX_RETRIES_ACKREPLY times!"
80712	"We tried to receive a reply for DVIO_MAX_RETRIES_REPLY times!"
80713	"We tried to receive an Acknowledge for DVIO_MAX_RETRIES_ACK times!"
80714	"VSM UART error timeout transmitting command"
80715	"VSM UART error timeout receiving reply"
80716	"VSM UART frame error occurred receiving from DVIO board"
80717	"VSM UART parity error occurred receiving from DVIO board"
80718	"The confirmation/indication from the DVIO module is invalid."
80719	"Setting the DVIO module in/out diagnostics mode failed"
90121	"Error: audio data in host memory contains wrong frequency: frequency Hz"
90122	"Error: audio data in host memory contains silence!"
90123	"There is no correct audio frame in the buffer"
90124	"The audio frame has an illegal version bit"
90125	"The audio frame has an illegal bitrate-index"
90126	"The audio frame has an illegal sampling rate"
90127	"The CRC of the audio frame is wrong"
90128	"The audio frame is not MPEG-I layer II !"
90129	"Error cannot de-mute DAC on analogue board"
90200	""
90201	"Initialisation of I2C failed"
90202	"Initialisation of VIP and EMPIRE failed"
90203	"Initialisation of PLL / Link failed."
90204	"Next descriptor address set wrong."
90205	"Turning on the colourbar failed"
90206	"No I2C communication possible to start video encoder."
90207	"Starting the video encoder failed."
90208	"Transfer of data from video encoder to VSM failed."
90209	"Stopping the encoder failed."
90210	"Turning off the colourbar failed."
90211	"Cannot intialize hostdecoder parallel input"
90212	"Cannot initialise VSM AV-out DMA port"
90213	"Cannot initialise VSM AV-out port"
90214	"Cannot start VSM AV-out DMA port"
90215	"Cannot start VSM AV-out port"
90216	"Transfer of data from VSM to host decoder failed."
90217	"VSM and Hostdec memory do not match (compared after transfer)"
90218	"Decoding of the video data in the hostdecoder memory failed"
90219	"The data in the hostdecoder is not equal to a colourbar"
90220	"The video encoder did not return the Group Of Picture count."
90221	"The video encoder did not receive data from the VIP."
90223	"Initialisation of VIP and EMPRESS failed"
90224	"The video encoder did not return the current status."

Error Nr	Error String
90225	"The video encoder timed out in BUSY mode. (no VIP input)"
90226	"The video encoder did not return the current bitrate."
90227	"The video encoder did not switch to ENCODING mode."
90228	"The video encoder could not start from STOP/IDLE mode."
90229	"The video encoder did not switch from IDLE to STOP mode."
90300	""
90301	"Initialisation of I2C failed"
90302	"I2C communication to VIP failed"
90303	"Initialisation of VIP failed"
90304	"Generation of Close Caption data failed"
90305	"VIP not locked to video signal"
90306	"Initialisation of VBI Extractor failed
90307	"No CC data received"
90308	"Closed Caption data overrun"
90309	"Closed Caption data does not match"
90310	"Switch off ColourBar failed"
90400	""
90401	"Initialisation of I2C failed"
90402	"Initialisation of VIP and EMPIRE failed"
90403	"Initialisation of PLL / Link failed."
90404	"Next descriptor address set wrong."
90405	"Turning on the colourbar failed"
90406	"No I2C communication possible to start video encoder."
90407	"Starting the video encoder failed."
90408	"Transfer of data from video encoder to VSM failed."
90409	"Stopping the encoder failed."
90410	"Turning off the colourbar failed."
90411	"Cannot intialize hostdecoder parallel input"
90412	"Cannot initialise VSM AV-out DMA port"
90413	"Cannot initialise VSM AV-out port"
90414	"Cannot start VSM AV-out DMA port"
90415	"Cannot start VSM AV-out port"
90416	"Transfer of data from VSM to host decoder failed."
90417	"VSM and Hostdec memory do not match (compared after transfer)"
90418	"Decoding of the video data in the hostdecoder memory failed"
90419	"The data in the hostdecoder is not equal to a colourbar"
90420	"The video encoder did not return the Group Of Picture count."
90421	"The video encoder did not receive data from the VIP."
90422	"Execution of the command on the analogue board failed."
90423	"Initialisation of VIP and EMPRESS failed"
90424	"The video encoder did not return the current status."
90425	"The video encoder timed out in BUSY mode. (no VIP input)"
90426	"The video encoder did not return the current bitrate."
90427	"The video encoder did not switch to ENCODING mode."
90428	"The video encoder could not start from STOP/IDLE mode."

Error Nr	Error String
90429	"The video encoder did not switch from IDLE to STOP mode."
90500	""
90501	"Initialisation of I2C failed"
90502	"I2C communication to VIP failed"
90503	"Initialisation of VIP failed"
90504	"Generation of Close Caption data failed"
90505	"VIP not locked to video signal"
90506	"Initialisation of VBI Extractor failed
90507	"No CC data received"
90508	"Closed Caption data overrun"
90509	"Closed Caption data does not match"
90510	"Switch off ColourBar failed"
90511	"Execution of the command on the analogue board failed."
90600	""
90601	"Initialisation of I2C failed"
90602	"Initialisation of VIP and EMPIRE failed"
90603	"Initialisation of PLL / Link failed."
90604	"Next descriptor address set wrong."
90605	"Turning on the colourbar failed"
90606	"No I2C communication possible to start video encoder."
90607	"Starting the video encoder failed."
90608	"Transfer of data from video encoder to VSM failed."
90609	"Stopping the encoder failed."
90610	"Turning off the colourbar failed."
90611	"Cannot intialize hostdecoder parallel input"
90612	"Cannot initialise VSM AV-out DMA port"
90613	"Cannot initialise VSM AV-out port"
90614	"Cannot start VSM AV-out DMA port"
90615	"Cannot start VSM AV-out port"
90616	"Transfer of data from VSM to host decoder failed."
90617	"VSM and Hostdec memory do not match (compared after transfer)"
90618	"Decoding of the video data in the hostdecoder memory failed"
90619	"The data in the hostdecoder is not equal to a colourbar"
90620	"The video encoder did not return the Group Of Picture count."
90621	"The video encoder did not receive data from the VIP."
90622	"Execution of the command on the analogue board failed."
90623	"Initialisation of VIP and EMPRESS failed"
90624	"The video encoder did not return the current status."
90625	"The video encoder timed out in BUSY mode. (no VIP input)"
90626	"The video encoder did not return the current bitrate."
90627	"The video encoder did not switch to ENCODING mode."
90628	"The video encoder could not start from STOP/IDLE mode."
90629	"The video encoder did not switch from IDLE to STOP mode."
90700	""
90701	"Initialisation of I2C failed"
90702	"I2C communication to VIP failed"
90703	"Initialisation of VIP failed"
90704	"Generation of Close Caption data failed"

Error Nr	Error String
90705	"VIP not locked to video signal"
90706	"Initialisation of VBI Extractor failed
90707	"No CC data received"
90708	"Closed Caption data overrun"
90709	"Closed Caption data does not match"
90710	"Switch off ColourBar failed"
90711	"Execution of the command on the analogue board failed."
90800	""
90801	"Error routing the audio back to the digital board."
90802	"Error cannot initialise I2C"
90803	"Error cannot initialise VIP"
90804	"Error cannot set ADC enable pin"
90805	"Error cannot set VSM audio clock"
90806	"Error preparing the 12kHz audio-sine"
90807	"Error cannot initialise audio encoder"
90808	"Error cannot initialise VSM audio in port"
90809	"Error cannot initialise VSM audio in DMA port"
90810	"Error cannot initialise VSM audio out DMA port"
90811	"Error cannot initialise audio VSM out port"
90812	"Error cannot initialise host decoder audio in"
90813	"Error loop audio user/dealer cannot start audio encoder"
90814	"Error cannot start VSM audio in DMA port"
90815	"Error starting the 12kHz audio-sine"
90816	"Error transfer data from audio encoder to VSM"
90817	"Error cannot start VSM AV out DMA port"
90818	"Error cannot start VSM AV out port"
90819	"Error transfer data from VSM to host decoder"
90820	"Error: audio data in host memory and VSM memory differ"
90821	"Error: audio data in host memory contains wrong frequency: frequency Hz"
90822	"Error: audio data in host memory contains silence!"
90823	"There is no correct audio frame in the buffer"
90824	"The audio frame has an illegal version bit"
90825	"The audio frame has an illegal bitrate-index"
90826	"The audio frame has an illegal sampling rate"
90827	"The CRC of the audio frame is wrong"
90828	"The audio frame is not MPEG-I layer II !"
90829	"Error cannot de-mute DAC on analogue board"
90900	""
90901	"Error routing the audio back to the digital board."
90902	"Error cannot initialise I2C"
90903	"Error cannot initialise VIP"
90904	"Error cannot set ADC enable pin"
90905	"Error cannot set VSM audio clock"
90906	"Error preparing the 12kHz audio-sine"
90907	"Error cannot initialise audio encoder"
90908	"Error cannot initialise VSM audio in port"
90909	"Error cannot initialise VSM audio in DMA port"
90910	"Error cannot initialise VSM audio out DMA port"
90911	"Error cannot initialise audio VSM out port"
90912	"Error cannot initialise host decoder audio in"
90913	"Error loop audio user/dealer cannot start audio encoder"
90914	"Error cannot start VSM audio in DMA port"
90915	"Error starting the 12kHz audio-sine"
90916	"Error transfer data from audio encoder to VSM"
90917	"Error cannot start VSM AV out DMA port"
90918	"Error cannot start VSM AV out port"

Error Nr	Error String
90919	"Error transfer data from VSM to host decoder"
90920	"Error: audio data in host memory and VSM memory differ"
90921	"Error: audio data in host memory contains wrong frequency: frequency Hz"
90922	"Error: audio data in host memory contains silence!"
90923	"There is no correct audio frame in the buffer"
90924	"The audio frame has an illegal version bit"
90925	"The audio frame has an illegal bitrate-index"
90926	"The audio frame has an illegal sampling rate"
90927	"The CRC of the audio frame is wrong"
90928	"The audio frame is not MPEG-I layer II !"
90929	"Error cannot de-mute DAC on analogue board"
140000	""
140001	"I2C to Clock failed" or "I2C initialisation failed"
140100	""
140101	"I2C to Clock failed" or "I2C initialisation failed"
141200	""
141201	"Progressive Scan Board I2C bus busy"
141211	"Progressive Scan Board I2C FLI2200 bus busy"
141212	"Progressive Scan Board I2C FLI2200 read access time-out"
141213	"Progressive Scan Board I2C FLI2200 no read acknowledge"
141214	"Progressive Scan Board I2C FLI2200 read failed"
141215	"Progressive Scan Board I2C FLI2200 write access time-out"
141216	"Progressive Scan Board I2C FLI2200 no write acknowledge"
141217	"Progressive Scan Board I2C FLI2200 write failed"
141218	"Progressive Scan Board I2C FLI2200 failed"
141221	"Progressive Scan Board I2C AD7196 bus busy"
141222	"Progressive Scan Board I2C AD7196 read access time-out"
141223	"Progressive Scan Board I2C AD7196 no read acknowledge"
141224	"Progressive Scan Board I2C AD7196 read failed"
141225	"Progressive Scan Board I2C AD7196 write access time-out"
141226	"Progressive Scan Board I2C AD7196 no write acknowledge"
141227	"Progressive Scan Board I2C AD7196 write failed"
141228	"Progressive Scan Board I2C AD7196 failed"
141300	""
141301	"Progressive Scan Route Enable failed"
141302	"Generating test image in Hostdecoder failed"
141400	""
141401	"Progressive Scan Route Disable failed"
141402	"Turning off test image in Hostdecoder failed"
141500	""
141501	"Progressive Scan Board I2C failed"
141600	""
141601	"Progressive Scan Board I2C failed"

Error Codes Nucleus 805

Error Code	Description	Bus	Components
0x00	No Error	-	-
0x11	No link register access	PA[8:0] I PAD[7:0]	Link I uP
0x12	No link register access or link reset failed	PA[8:0] I PAD[7:0] I 1394_RSTn	Link I uP I FPGA
0x13	No link register access or link reset failed	PA[8:0] I PAD[7:0] I 1394_RSTn	Link I uP I FPGA
0x14	No link register access	PA[8:0] I PAD[7:0]	Link I uP
0x15	No link register access	PA[8:0] I PAD[7:0]	Link I uP
0x16	No link register access	PA[8:0] I PAD[7:0]	Link I uP
0x17	Link reset failed	1394_RSTn	Link I FPGA
0x18	Link reset failed	1394_RSTn	Link I FPGA
0x19	Cycle timer in link chip does not increment	-	Link
0x1A	Interrupt from Link chip does not go low at 8051	LINK_INTn I PINT1n	Link I FPGA I uP
0x1B	Interrupt from Link chip does not go high at 8051	LINK_INTn I PINT1n	Link I FPGA I uP
0x1C	Submission of read request to Phy timed out	Bus_LP	Phy
0x1D	Reception of read data from Phy timed out	Bus_LP	Phy
0x1E	Inproper Phy read address was received from Phy	Bus_LP	Phy
0x1F	Phy write timed out	Bus_LP	Phy
0x20	Could not read reg #2 of Phy	Bus_LP	Phy
0x21	Could not write 0xaa to reg #1 of phy	Bus_LP	Phy
0x22	Could not write 0x55 to reg #1 of phy	Bus_LP	Phy
0x23	Read incorrect default gapcount from Phy	Bus_LP	Phy
0x24	Read incorrect updated gapcount from Phy	Bus_LP	Phy
0x25	Read incorrect gapcount from Phy after reset	F117 I F173	Phy I OptoPR
0x26	Expecting no 1394 connectivity; while Phy.CNA indicates connection	F108 I PHY_CNA I Bus_PC	Phy I OptoCNA I FPGA
0x27	Expecting 1394 connectivity; while Phy.CNA indicates no connection	F108 I PHY_CNA I Bus_PC	Phy I OptoCNA I FPGA
0x28	Expected port1 unconnected; but found connected	Bus_PC	Phy
0x29	Phy read retry limit exceeded	-	Phy
0x2A	Expected port2 unconnected; but found connected	-	Phy
0x2B	Expected port3 unconnected; but found connected	-	Phy
0x2C	Expected 0x1 in lower nibble of Phy reg 7	-	Phy
0x2D	Expected CPS and C bit set in Phy reg 6	-	Phy
0x30	Internal ram problem in address lines	Internal in uP	P89C51RD2
0x31	Internal ram problem in data lines	Internal in uP	P89C51RD2
0x32	External ram problem in address lines	PA[15:0] I PAD[7:0] I PRDn I PWRn	P89C51RD2/CY62256/ 74HC573
0x33	External ram problem in data lines	PAD[7:0]	P89C51RD2/CY62256/ 74HC573
0x34	Problem accessing flex scratch register	PAD[7:0]	EPF6024
0x36	INT0n stuck at '0'	PINT0n	EPF6024 / P89C51RD2
0x37	INT0n stuck at '1'	PINT1n	EPF6024 / P89C51RD2
0x38	Problem accessing NW701 registers	HAD[7:0]IDV_Asn/RWn/DSUn/DSLn	EPF6024 / NW701
0x39	Reset line to NW701 not functioning	DV_RSTn	EPF6024 / NW701
0x3A	Checksum of codespace 0x0000-0xfbff is not 0x00	Incorrectly programmed	P89C51RD2
0xF4	PHY chip not responding	-	Phy
0xF5	LINK chip not responding	-	Phy

5.5 Loop tests

The following loops can be distinguished:

- Loops performed on the digital board only
- User Dealer loops performed on the digital and analogue board
- System loops performed via an external connection: outputs are looped back to the inputs.

5.5.1 Nucleus 900: Digital Audio Loop

This nucleus tests the audio path through the digital board

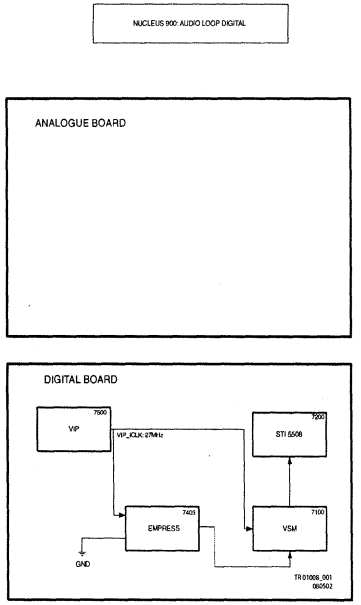


Figure 5-9

5.5.2 Nucleus 901: Audio User Dealer Loop

This Nucleus is only possible in NAFTA sets.
A PCM audio sine of 12kHz is generated in the Host Decoder for a while and sent to the analogue board. The signal coming from the analogue board is encoded again and sent to the memory of the host decoder for comparison. This nucleus tests the components on the audio signal path:

- Host decoder
- Flex connection between connector 1602 (digital board) and connector 1900 (analogue board)
- DAC
- Op-amp
- Scart switch IC
- ADC
- Audio Encoder
- VIP
- VSM

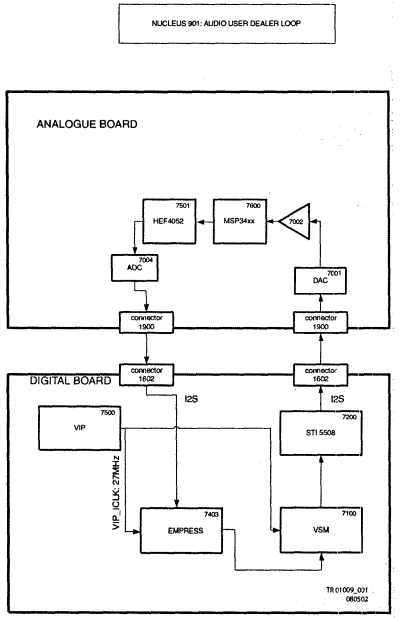


Figure 5-10

5.5.3 Nucleus 902: Digital Video Loop

A colourbar generated in the host decoder is looped through the VIP, Empire, and VSM and checked again in the host decoder. The following components are tested on the video signal path:

- VIP
- Empire
- VSM
- Host decoder

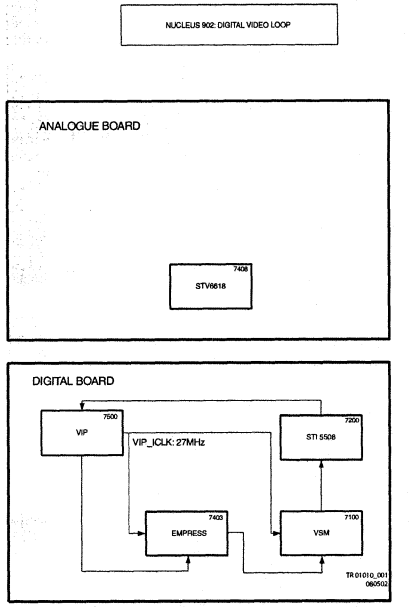


Figure 5-11

5.5.4 Nucleus 903: Digital Video VBI Loop

Nucleus for testing the components on the video VBI signal path:

- The VIP
- The VSM
- The Host Decoder

This is done by using the internal test signal source (digital board only)
Remark: this test is only successful if nucleus 121 is carried out first.

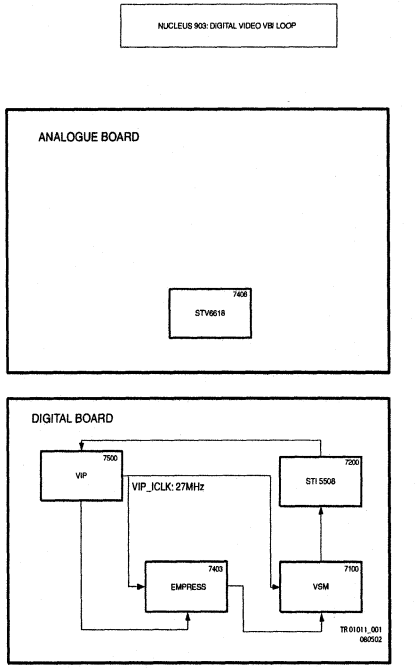


Figure 5-12

5.5.5 Nucleus 904: System Video Loop

Nucleus for testing the components on the video signal system path:

- The VIP
- The video encoder
- The VSM
- The host decoder
- The analogue board

On the analogue board the video signal will be routed to the SCART (EUROPE) or CINCH (NAFTA). There it will be looped back externally by means of the proper cable

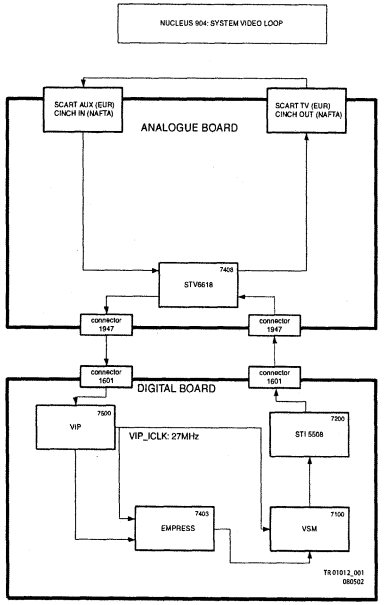


Figure 5-13

5.5.6 Nucleus 905: System Video VBI Loop

This nucleus tests the components on the video signal path:

- The VIP
- The VSM
- The Host Decoder

The video CVBS signal is routed to the output of the analogue board where it will be looped back by means of an external cable

Remark: this test is only successful if nucleus 121 is carried out first.

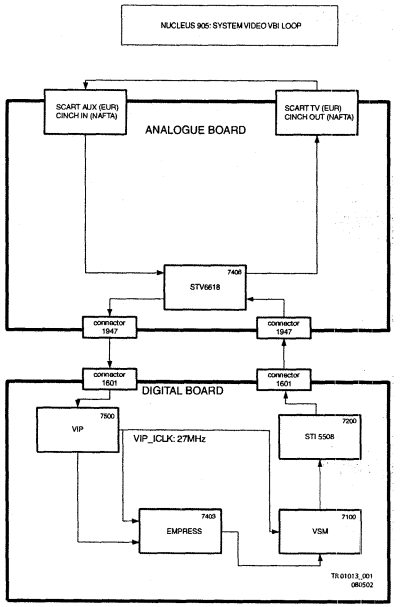


Figure 5-14

5.5.7 Nucleus 906: Video User Dealer Loop

Nucleus for testing the components on the video signal system path:

- The VIP
- The video encoder
- The VSM
- The host decoder
- The analogue board

On the analogue board, the video signal is internally routed back to the digital board.

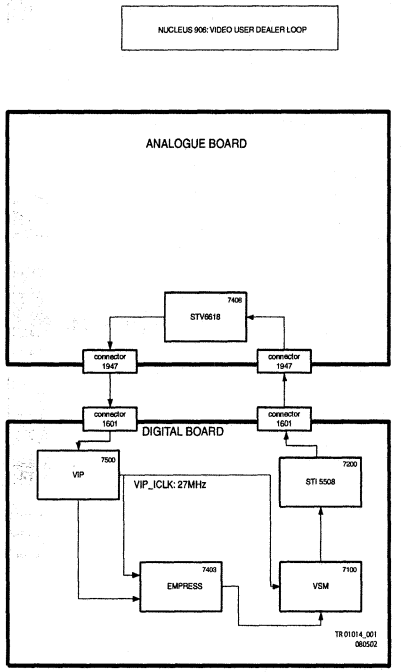


Figure 5-15

5.5.8 Nucleus 907: Video VBI User Dealer Loop

This nucleus tests the components on the video VBI signal path:

- The VIP
- The VSM
- The Host Decoder

The signal is routed back internally on the analogue board

Remark: this test is only successful if nucleus 121 is carried out first.

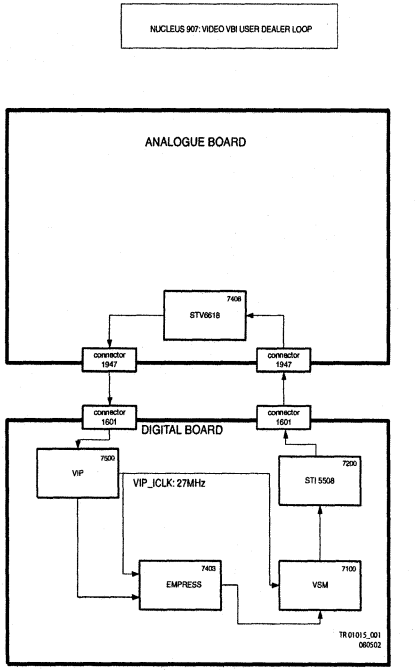


Figure 5-16

5.5.9 Nucleus 908: System Audio Loop Scart (Europe)

Nucleus for testing the components on the audio signal path:
- The hostdecoder
- The analogue board
- The audio encoder
- The VSM

On the analogue board, audio is passed to the SCART connector, where a SCART cable needs to be used to loop back the audio signal to the digital board

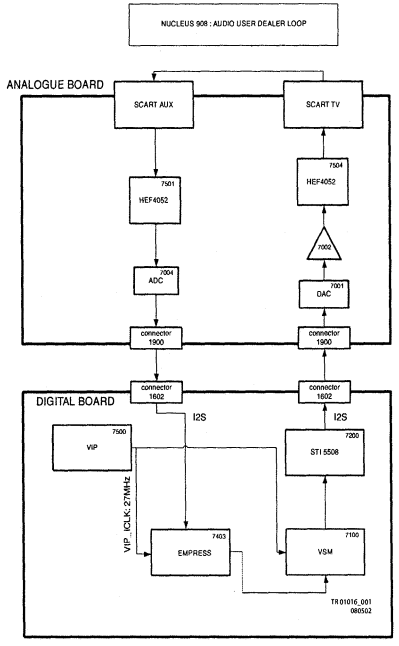


Figure 5-17

5.5.10 Nucleus 909: System Audio Loop CINCH (Nafta)

Nucleus for testing the components on the audio signal path:
- The hostdecoder
- The analogue board
- The audio encoder
- The VSM

A parameter has to be specified to select the appropriate output routing. This parameter is identical to nucleus 713.

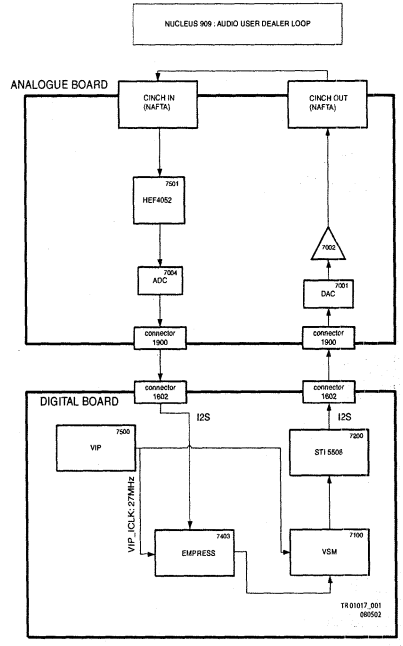


Figure 5-18

5.5.11 Nucleus 910: DVIO Video Input

Nucleus for testing the components on the video signal path:
- The DVIO board
- The VIP
- The video encoder
- The VSM
- The host decoder

Note :This Test is not valid for Nafta in DVDR-Lead. For Europe the sound will be available on scart 2.

5.5.12 Nucleus 911: DVIO Video VIP

Nucleus for testing the components on the video signal system path:
- The host decoder
- The analogue board
- The VIP

On the analogue board the video signal will be routed according to the parameter. There it will be looped back externally by means of the proper cable.

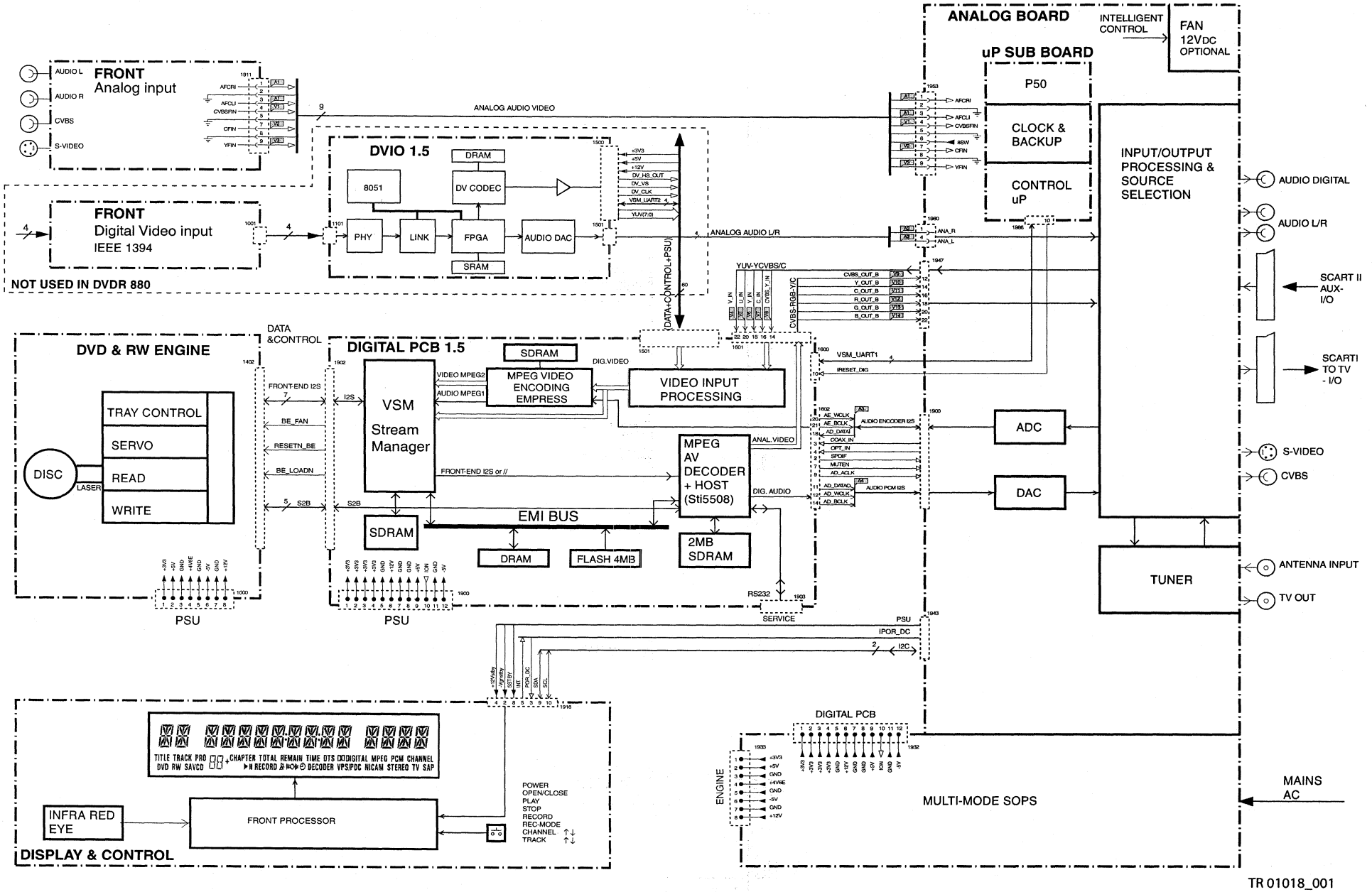
The correct Routing path has to be selected by a parameter:

Analog board Version	Selectable parameter	Internal call to nucleus 712
01	1	712.21
11	1	712.21
31	2	712.17
31	3	721.18
31	3	712.19
41	2	712.17
41	3	712.18
41	4	712.19
41	5	712.20
71	4	712.19

Remark: Nucleus 704 gives the analog board version

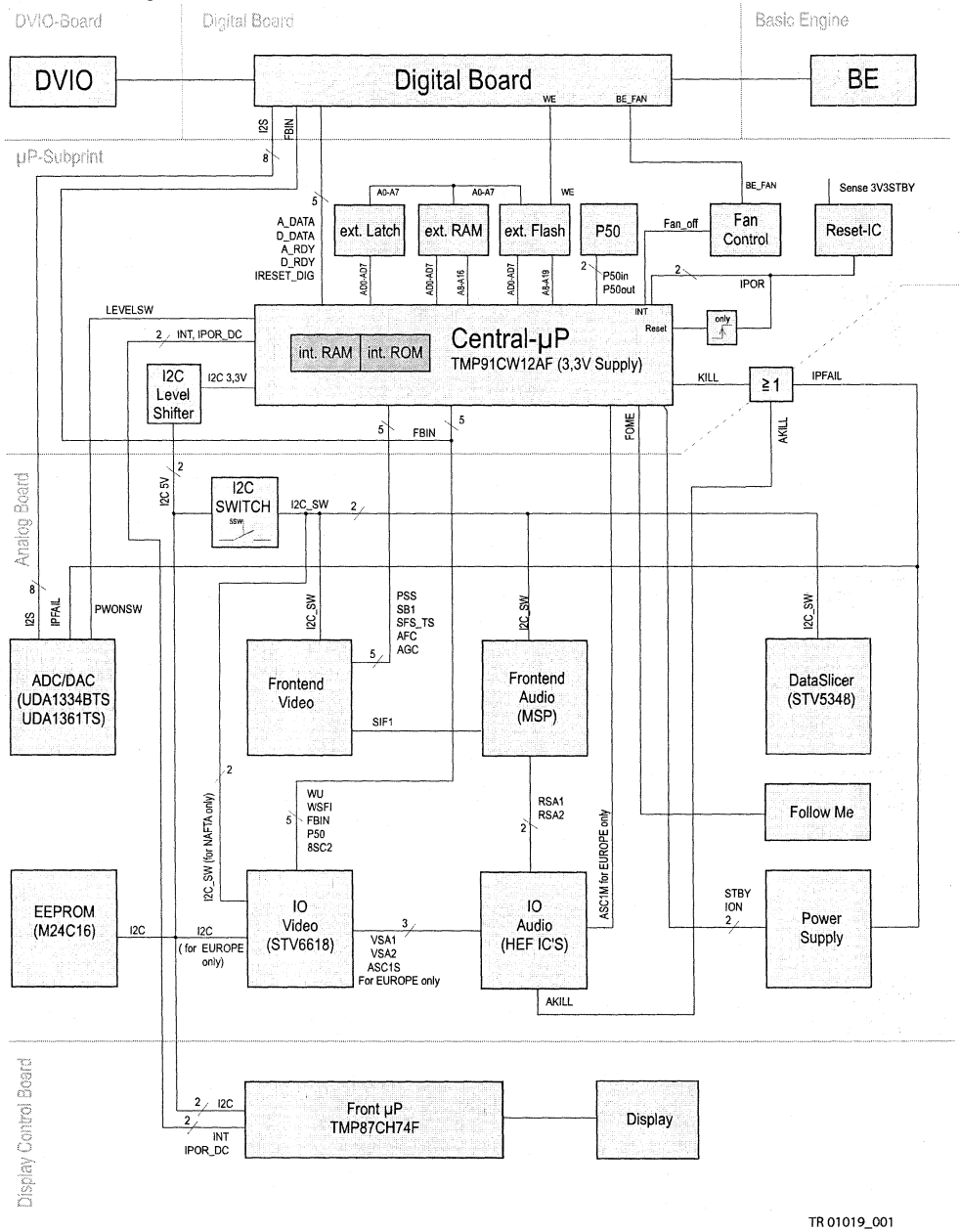
6. Block Diagrams, Waveforms, Wiring Diagram.

BLOCK DIAGRAM DVDR880, DVDR890 EURO



TR 01018_001
130502

Blockdiagram Control Lines and Bus Systems



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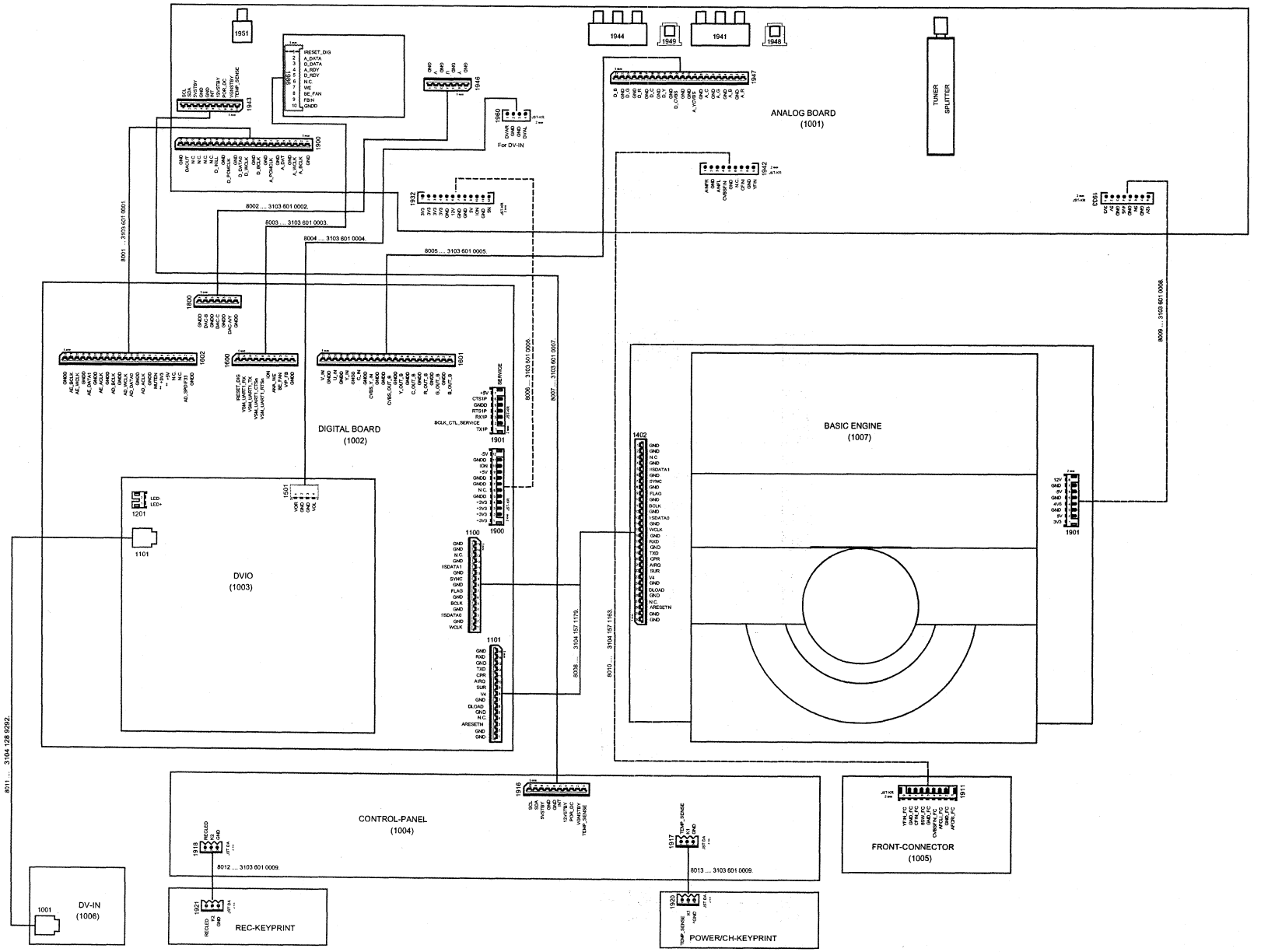
130502

Wiring Diagram



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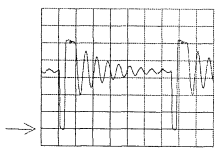
150502

Waveforms

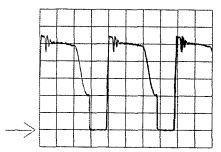
Waveforms Analog Board, uPC Sub PWB

F327 VDrain (Standby)



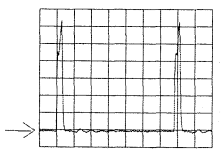
A: DC, 100V/Div
5us/Div

F327 VDrain (no disc loaded)



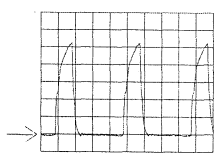
A: DC, 100V/Div
2us/Div

I324 VDrain (Standby)



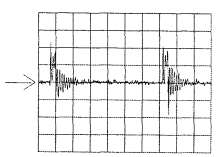
A: DC, 1V/Div
5us/Div

I324 VGate (no disc loaded)



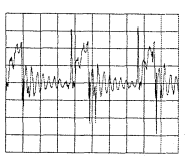
A: DC, 2V/Div
2us/Div

I325 VSource (Standby)



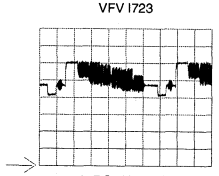
A: DC, 50mV/Div
5us/Div

I325 VSource (no disc loaded)



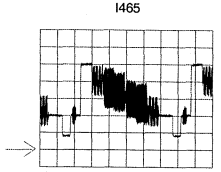
A: DC, 50mV/Div
2us/Div

VFV I723



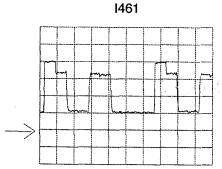
A: DC, 500mV/Div
10us/Div

I465



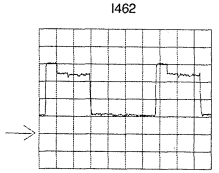
A: DC, 500mV/Div
10us/Div

I461



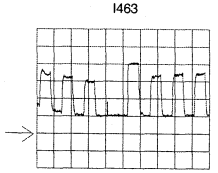
A: DC, 500mV/Div
10us/Div

I462



A: DC, 500mV/Div
10us/Div

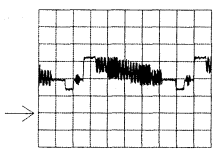
I463



A: DC, 500mV/Div
10us/Div

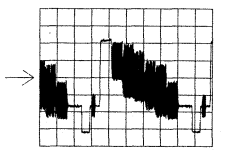
Waveforms Analog Board, uPC Sub PWB

A_CVBS I405



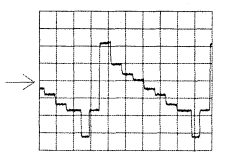
A: DC, 500mV/Div
10us/Div

D_CVBS F4712



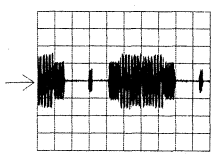
A: DC, 200mV/Div
10us/Div

D_Y F4714



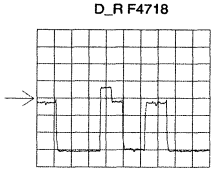
A: DC, 200mV/Div
10us/Div

D_C F4716



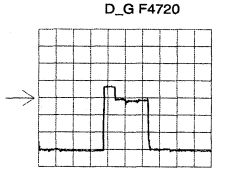
A: DC, 200mV/Div
10us/Div

D_R F4718



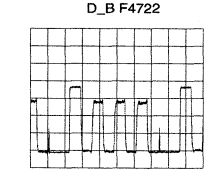
A: DC, 200mV/Div
10us/Div

D_G F4720



A: DC, 200mV/Div
10us/Div

D_B F4722

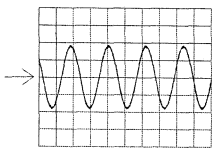


A: DC, 200mV/Div
10us/Div

TR 01021_001
150502

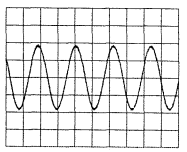
Waveforms Analog Board, uPC Sub PWB

I502/I504



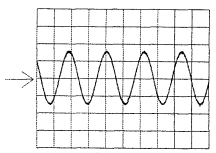
A: DC, 500mV/Div
500us/Div

I517/I518



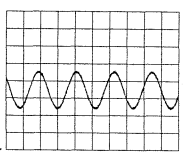
A: DC, 500mV/Div
500us/Div

F501/F502



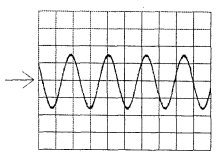
A: DC, 500mV/Div
500us/Div

I014/I032



A: DC, 500mV/Div
500us/Div

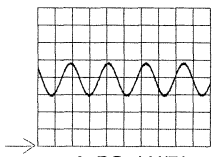
ARDAC/ALDAC F010/F011



A: DC, 500mV/Div
500us/Div

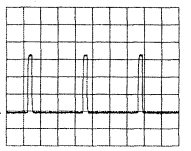
Waveforms Analog Board, uPC Sub PWB

I623



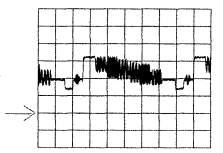
A: DC, 1 V/Div
500us/Div

SYNC F843



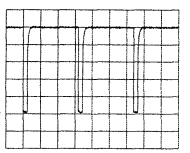
A: DC, 500mV/Div
10us/Div

A_CVBS F8008



A: DC, 500mV/Div
10us/Div

I818



A: DC, 1 V/Div
20us/Div

TR 01022_001
140502

Waveforms Digital Board

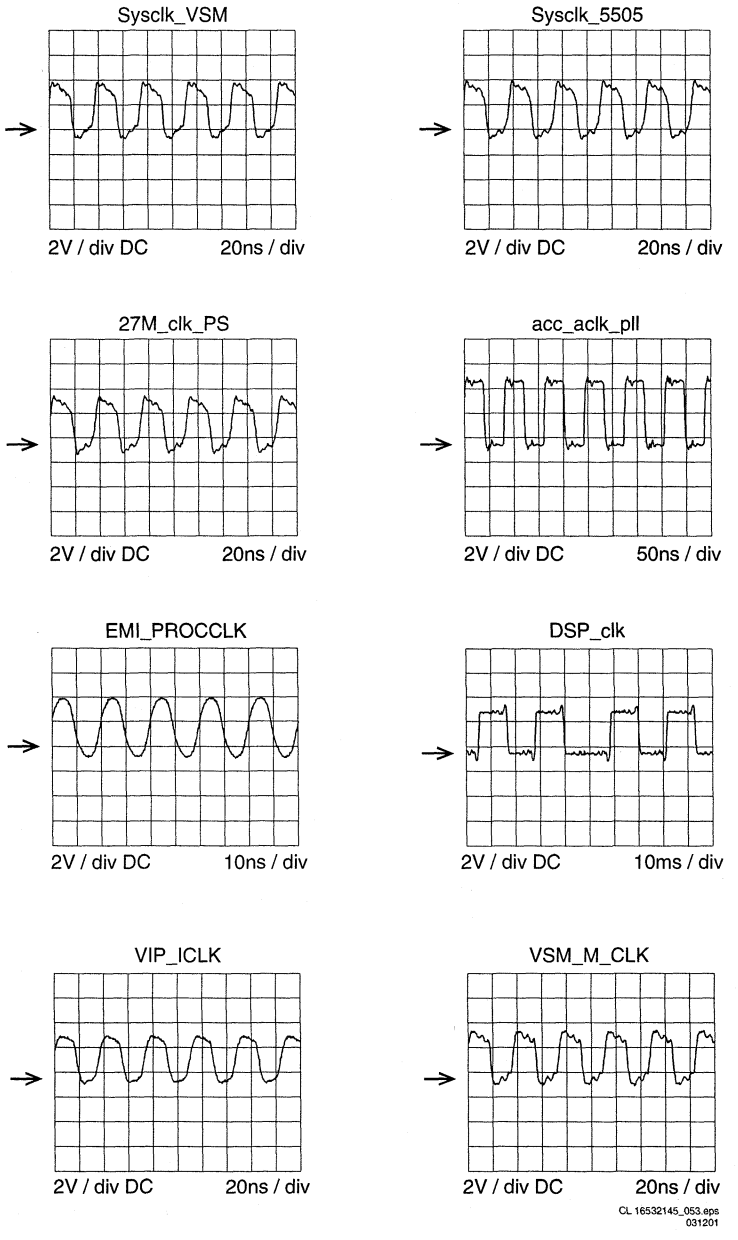


Figure 6-1

Waveforms Digital Board

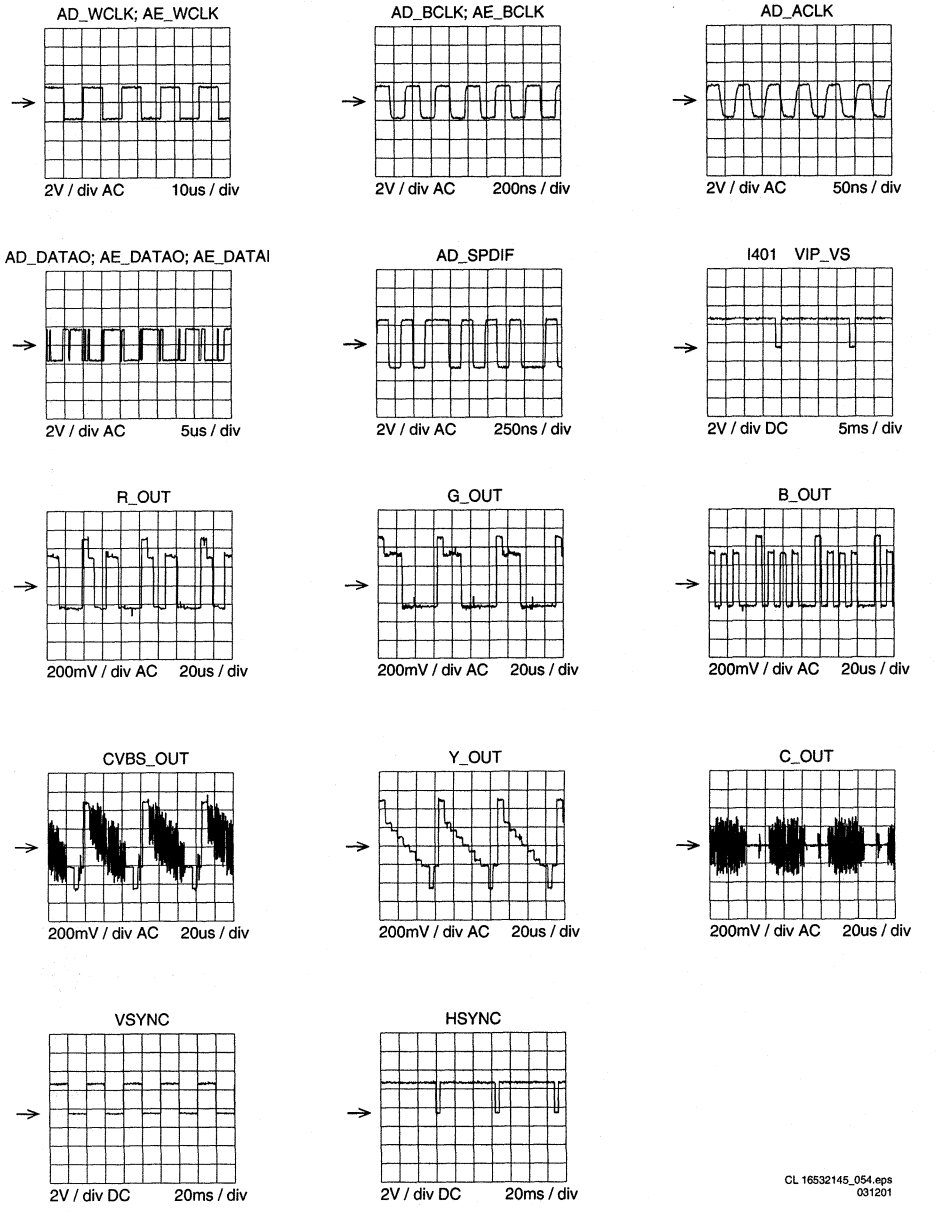
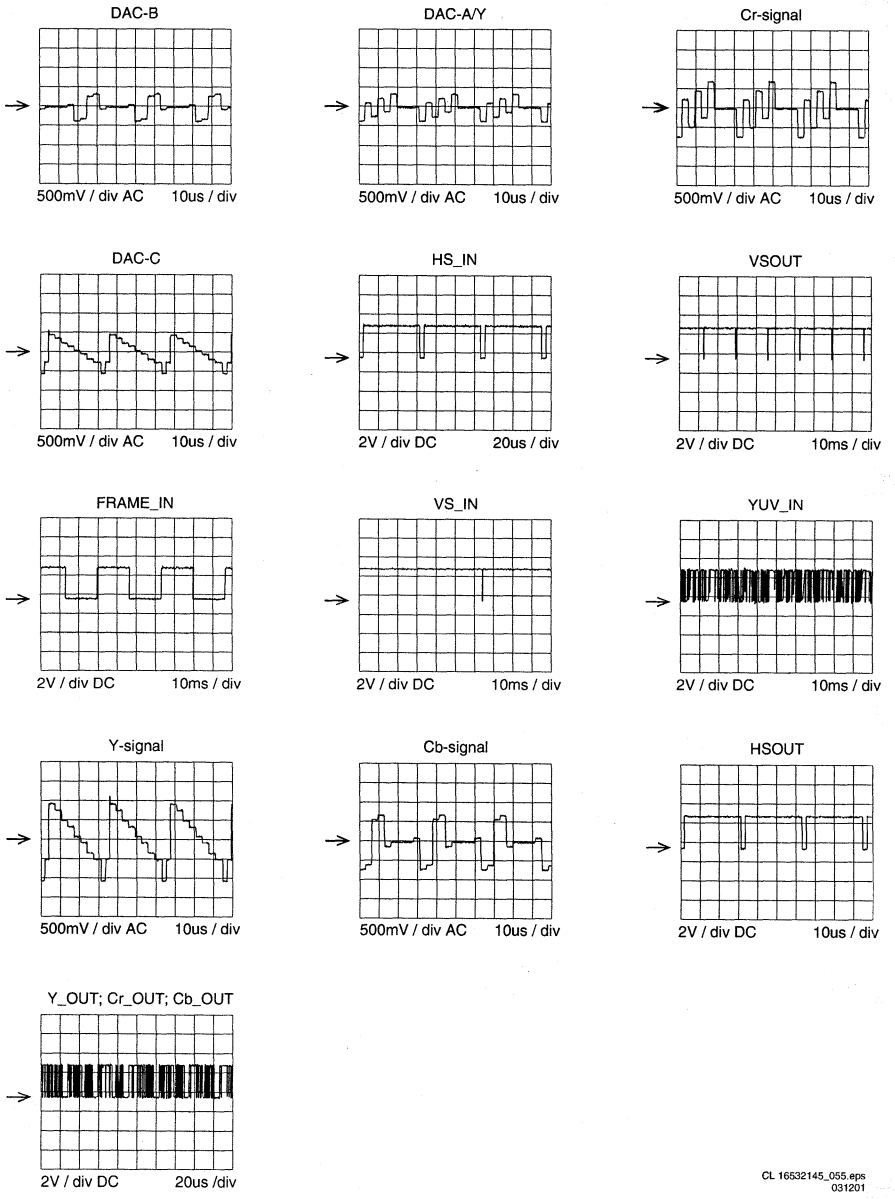


Figure 6-2

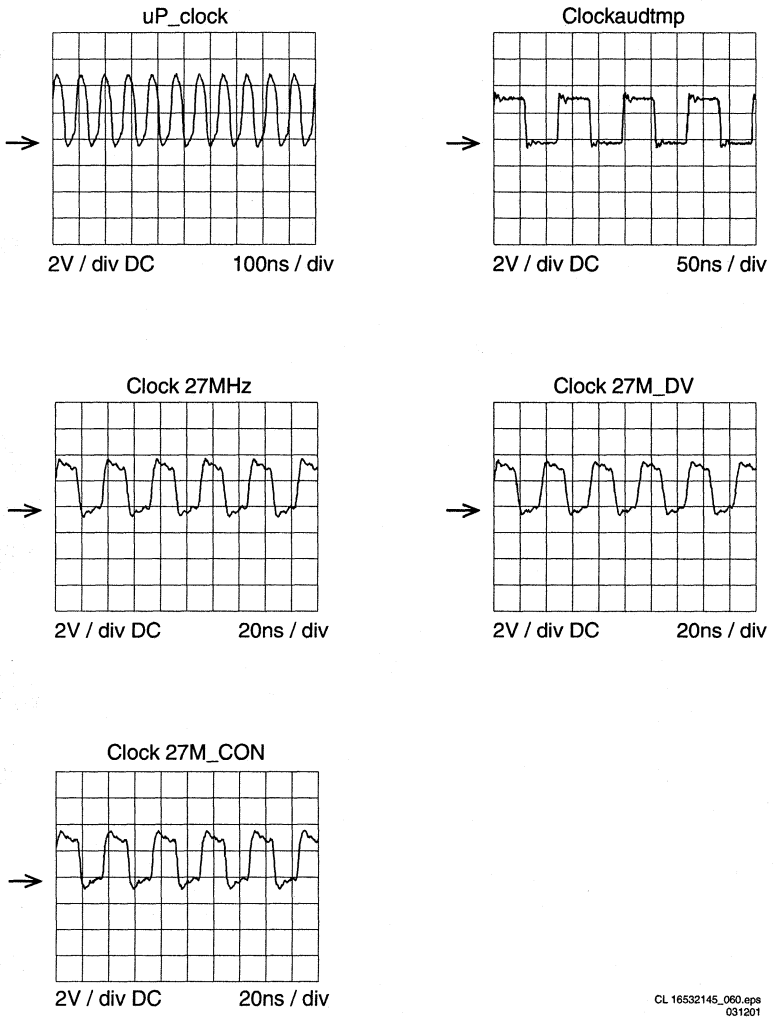
Waveforms Digital Board



CL 16532145_055.eps
031201

Figure 6-3

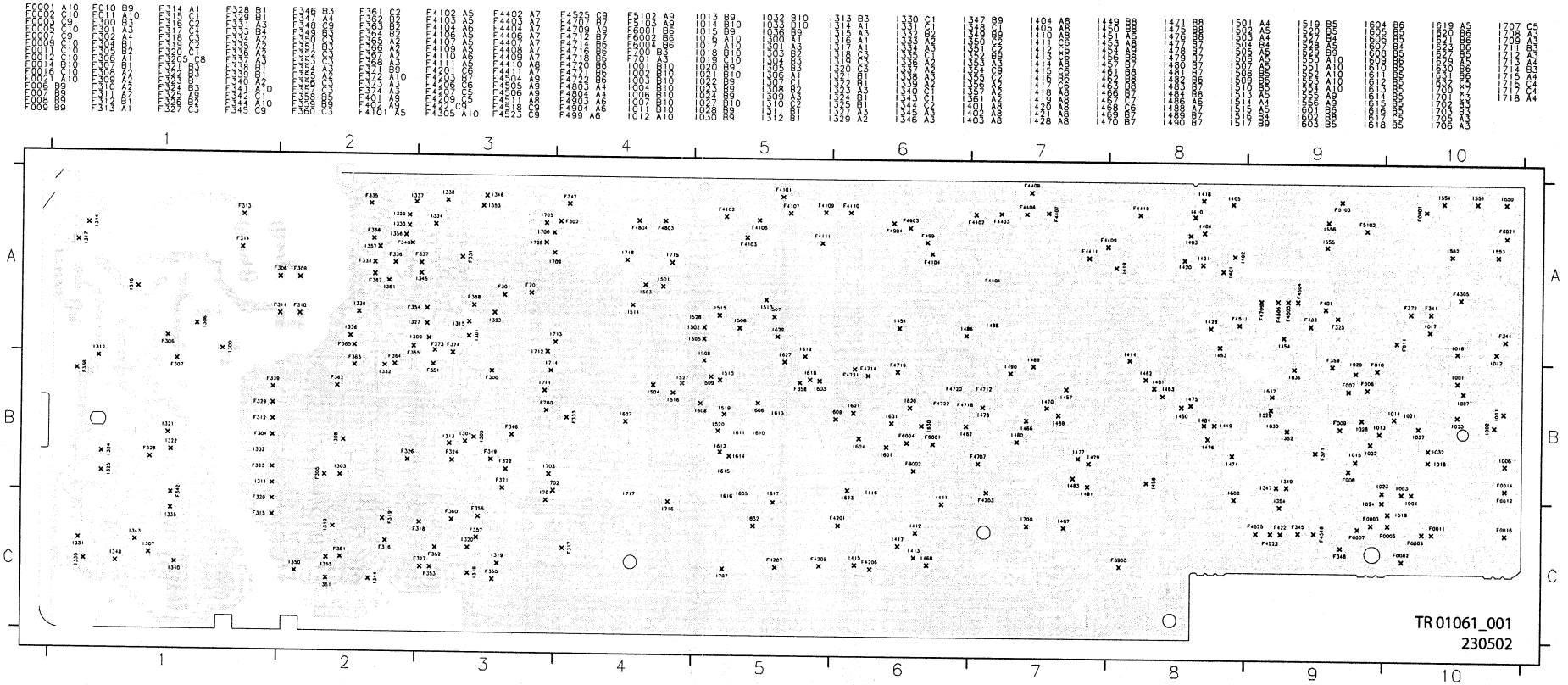
Waveforms DVIO



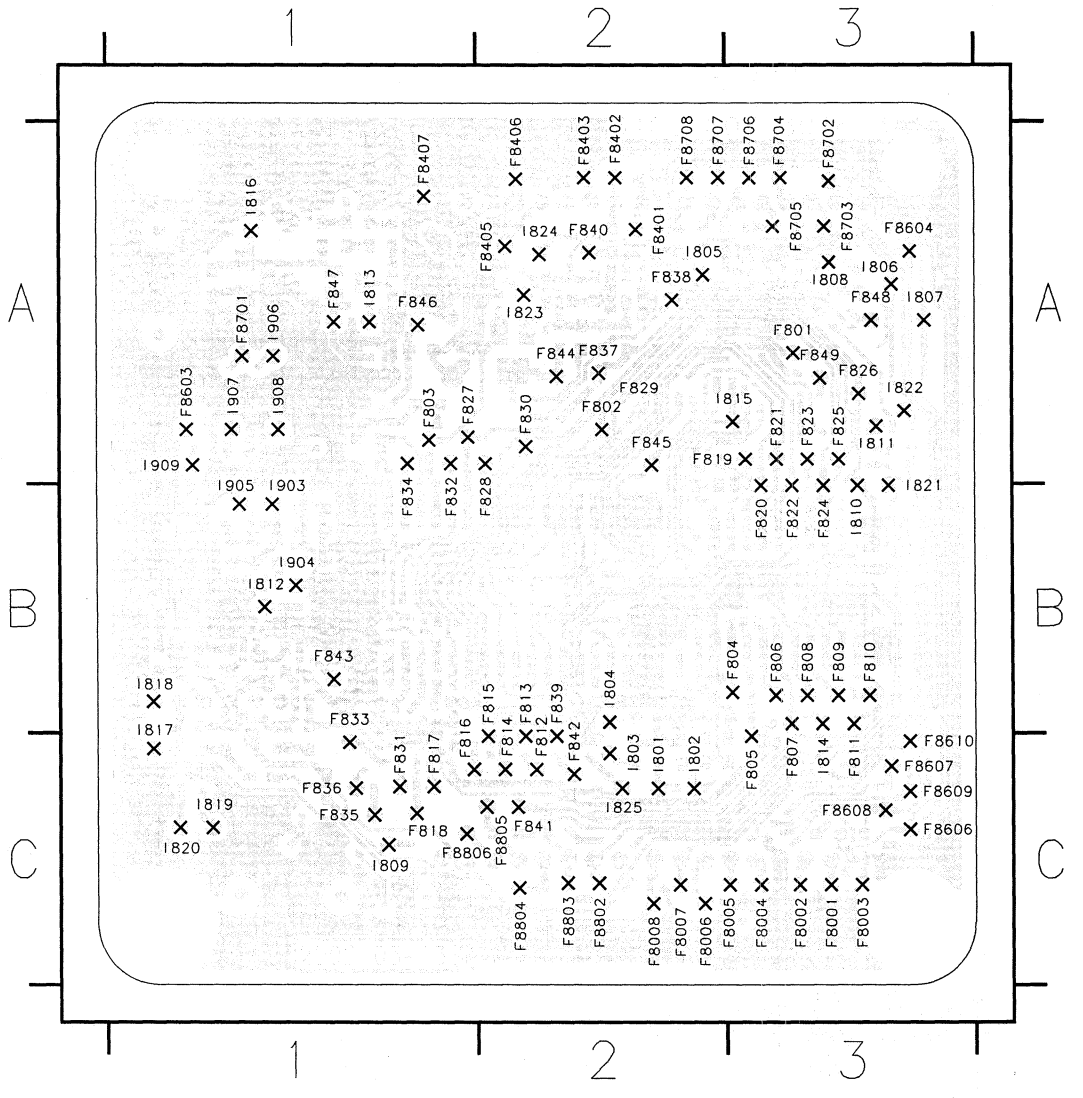
CL 16532145_060.eps
031201

Figure 6-4

Test points overview Analog Board



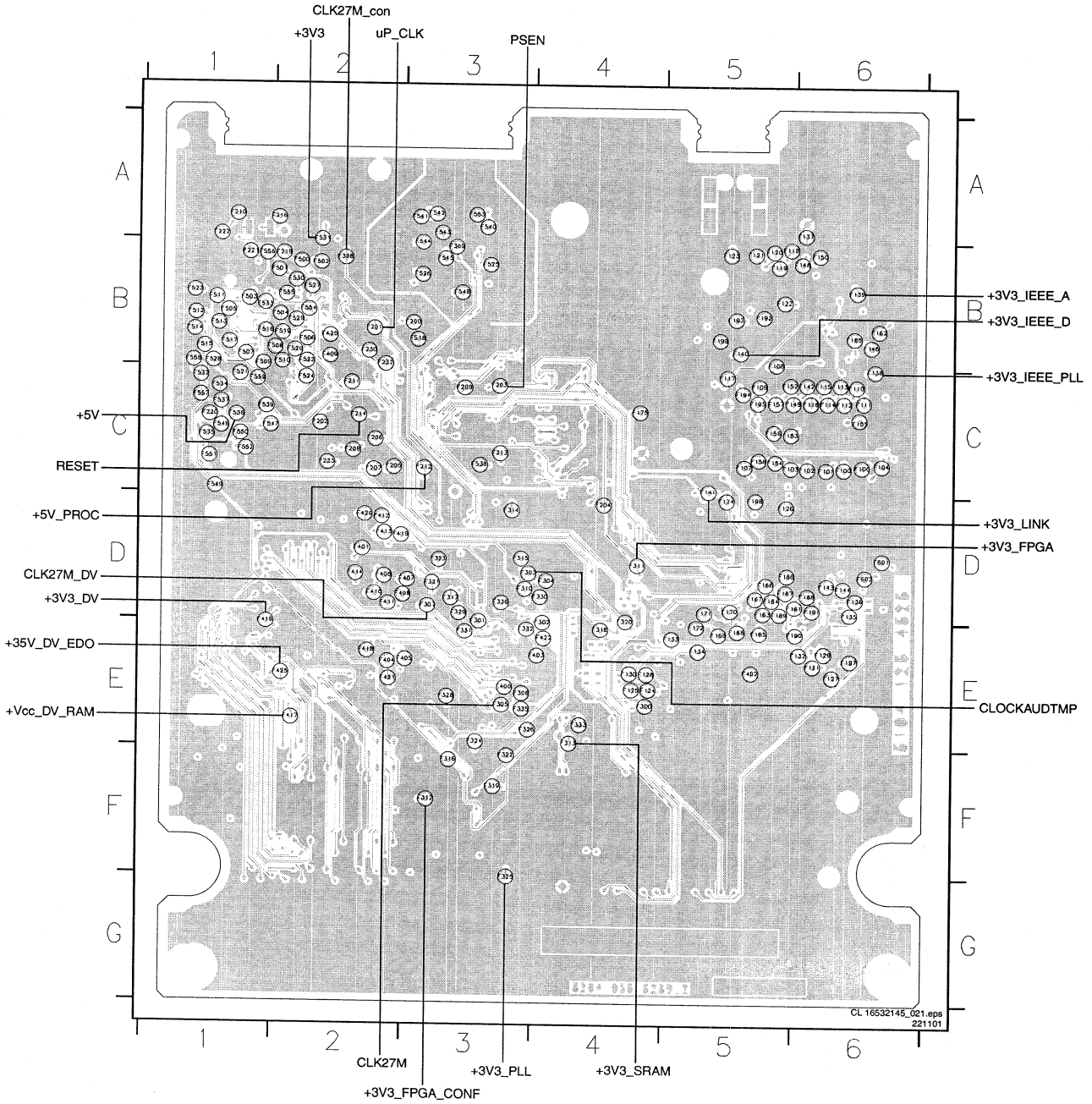
Test points overview UPC12 Sub PCB



F8001	C3	F8403	A2	1817	C1		
F8002	C3	F8405	A2	1818	B1		
F8003	C3	F8406	A2	1819	C1		
F8004	C3	F8407	A1	1820	C1		
F8005	C3	F841	C2	1821	B3		
F8006	C2	F842	C2	1822	A3		
F8008	C2	F843	B1	1823	A2		
F8009	C2	F844	A2	1824	A2		
F801	A3	F845	A2	1825	C2		
F802	A2	F846	A1	1903	B1		
F803	A1	F847	A1	1904	B1		
F804	B3	F848	A3	1905	B1		
F805	C3	F849	A3	1906	A1		
F806	B3	F8601	A1	1907	A1		
F807	B3	F8602	A3	1908	A1		
F808	B3	F8603	C3	1909	A1		
F809	B3	F8604	C3				
F810	B3	F8605	C3				
F811	B3	F8606	C3				
F812	C2	F8607	C3				
F813	C2	F8608	C3				
F814	C2	F8609	C3				
F815	C2	F8610	C3				
F816	C1	F8701	A1				
F817	C1	F8702	A3				
F818	C1	F8703	A3				
F819	A3	F8704	A3				
F820	B3	F8705	A3				
F821	A3	F8706	A3				
F822	B3	F8707	A2				
F823	A3	F8708	A2				
F824	B3	F8802	C2				
F825	A3	F8803	C2				
F826	A3	F8804	C2				
F827	A1	F8805	C2				
F828	A2	F8806	C1				
F830	A2	I8001	C2				
F831	C1	I8002	C2				
F832	A1	I8003	C2				
F833	C1	I8004	B2				
F834	A1	I8005	A2				
F835	C1	I8006	A3				
F836	C1	I8007	A3				
F837	A2	I8008	A3				
F838	A2	I8009	C1				
F839	C2	I8010	B3				
F840	A2	I8011	A3				
F8401	A2	I8012	B1				
F8402	A2	I8013	A1				
		I8014	B3				
		I8015	A3				
		I8016	A1				

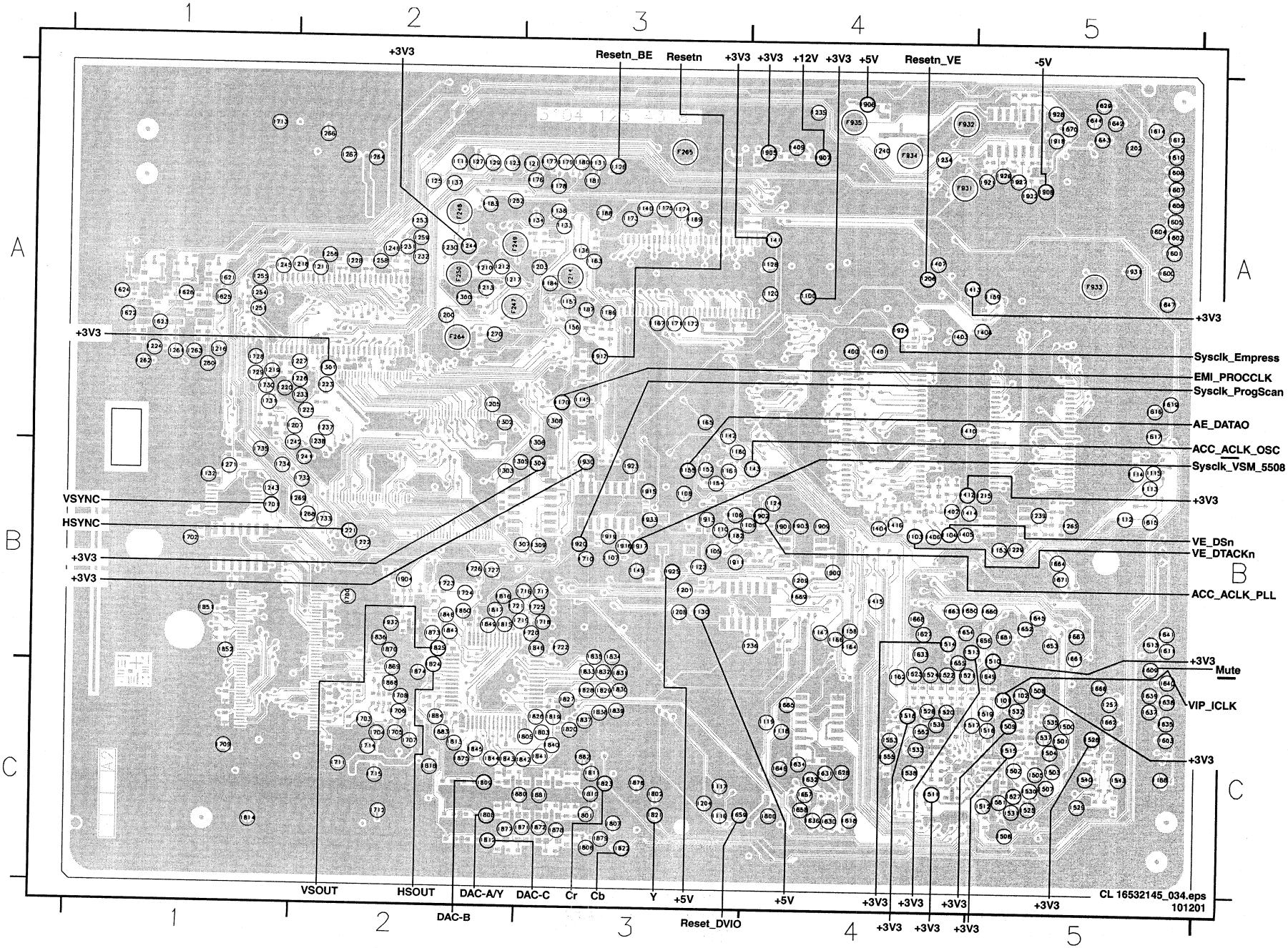
TR 01053_001
140502

Test points overview DIVIO Board



F100	C6	F144	D6	F206	C2	F328	E3	F513	B1
F100	C6	F146	B6	F206	C2	F329	D3	F513	B1
F101	C6	F146	B6	F207	C2	F329	D3	F514	B1
F101	C6	F148	B6	F207	C2	F330	D4	F514	B1
F102	C6	F148	B6	F208	C2	F330	D4	F515	B1
F102	C6	F149	C5	F208	C2	F331	E3	F515	B1
F103	C5	F149	C5	F209	C3	F331	E3	F516	B1
F103	C5	F150	B6	F209	C3	F332	E3	F516	B1
F104	C6	F150	B6	F210	A1	F332	E3	F517	B1
F104	C6	F152	C5	F210	A1	F333	E4	F517	B1
F105	C6	F152	C5	F211	C2	F333	E4	F518	B3
F105	C6	F153	C5	F211	C2	F335	E3	F518	B3
F106	C6	F153	C5	F212	C3	F335	E3	F519	B2
F106	C6	F154	C5	F212	C3	F336	D3	F519	B2
F107	C5	F154	C5	F213	C3	F336	D3	F520	B2
F107	C5	F156	C5	F213	C3	F400	E3	F520	B2
F108	B5	F156	C5	F214	C2	F400	E3	F521	C1
F108	B5	F157	C5	F214	C2	F401	D2	F521	C1
F109	C5	F157	C5	F216	A2	F401	D2	F522	B2
F109	C5	F158	C5	F216	A2	F402	E5	F522	B2
F110	C6	F158	C5	F219	B2	F402	E5	F523	B1
F110	C6	F161	D6	F219	B2	F403	E4	F523	B1
F111	C6	F161	D6	F220	C1	F403	E4	F524	C2
F111	C6	F162	B6	F220	C1	F404	E2	F524	C2
F112	C6	F162	B6	F221	B1	F404	E2	F525	B3
F112	C6	F163	D5	F221	B1	F405	E3	F525	B3
F113	C6	F163	D5	F222	A1	F405	E3	F526	B3
F113	C6	F165	E5	F222	A1	F406	D2	F526	B3
F114	C6	F165	E5	F223	C2	F406	D2	F527	B2
F114	C6	F166	D5	F223	C2	F407	D3	F527	B2
F115	C6	F166	D5	F230	B2	F407	D3	F528	B1
F115	C6	F167	D5	F230	B2	F408	D2	F528	B1
F116	C6	F167	D5	F232	B2	F408	D2	F529	B2
F116	C6	F168	E5	F232	B2	F409	B2	F529	B2
F117	C5	F168	E5	F300	E4	F409	B2	F530	B2
F117	C5	F169	E5	F300	E4	F410	D2	F530	B2
F118	B5	F169	E5	F301	D3	F410	D2	F531	A2
F118	B5	F170	D5	F301	D3	F411	D2	F531	B2
F119	B5	F170	D5	F302	E4	F411	D2	F532	C1
F119	B5	F171	D5	F302	E4	F412	D2	F532	C1
F120	B5	F171	D5	F303	D3	F412	D2	F533	B1
F120	B5	F172	E5	F303	D3	F413	D2	F533	B1
F121	B5	F172	E5	F304	D4	F413	D2	F534	C1
F121	B5	F174	D5	F304	D4	F414	D2	F534	C1
F122	B5	F174	D5	F305	E3	F414	D2	F535	C1
F122	B5	F175	C4	F305	E3	F416	E1	F535	C1
F123	B5	F175	C4	F306	E3	F416	E1	F536	C1
F123	B5	F184	D5	F306	E3	F417	E2	F536	C1
F124	E4	F184	D5	F307	D3	F417	E2	F537	C1
F124	E4	F185	B6	F307	D3	F418	E2	F537	C1
F125	E4	F185	B6	F308	B2	F418	E2	F538	C3
F125	E4	F186	D5	F308	B2	F419	D2	F538	C3
F126	D5	F186	D5	F309	B3	F419	D2	F539	C1
F126	D5	F187	D5	F309	B3	F420	B2	F539	C1
F127	E6	F187	D5	F310	D3	F420	B2	F540	A3
F127	E6	F188	D6	F310	D3	F421	E2	F540	A3
F128	E4	F188	D6	F311	D4	F421	E2	F541	A3
F128	E4	F189	D5	F311	D4	F422	E4	F541	A3
F129	E6	F189	D5	F312	F3	F422	E4	F542	A3
F129	E6	F190	E6	F312	F3	F425	E2	F542	A3
F130	E4	F190	E6	F313	E4	F425	E2	F543	A3
F130	E4	F191	D6	F313	E4	F426	D2	F543	A3
F131	E6	F191	D6	F314	D3	F426	D2	F544	B3
F131	E6	F192	B5	F314	D3	F500	B2	F544	B3
F132	E6	F192	B5	F315	D3	F500	B2	F545	B3
F132	E6	F193	B5	F315	D3	F501	B2	F545	B3
F133	E5	F193	B5	F316	F3	F501	B2	F546	C1
F133	E5	F194	C5	F316	F3	F502	B2	F546	C1
F134	E5	F194	C5	F317	D3	F502	B2	F547	C1
F134	E5	F195	C5	F317	D3	F503	B1	F547	C1
F135	D6	F195	C5	F318	E4	F503	B1	F548	B3
F135	D6	F197	E6	F318	E4	F504	B2	F548	B3
F136	D6	F197	E6	F319	F3	F504	B2	F549	C1
F136	D6	F198	D5	F319	F3	F505	B1	F549	C1
F137	A6	F198	D5	F320	D4	F505	B1	F550	C1
F137	A6	F199	B5	F320	D4	F506	B2	F550	C1
F138	C6	F199	B5	F321	D3	F506	B2	F551	C1
F138	C6	F200	B3	F321	D3	F507	B1	F551	C1
F139	B6	F200	B3	F322	F3	F507	B1	F552	C1
F139	B6	F201	B2	F322	F3	F508	B2	F552	C1
F140	B5	F201	B2	F323	D3	F508	B2	F553	A3
F140	B5	F202	C2	F323	D3	F509	B1	F553	A3
F141	C5	F202	C2	F324	E3	F509	B1	F554	B2
F141	C5	F203	C3	F324	E3	F510	B2	F554	B2
F142	C6	F203	C3	F325	G3	F510	B2	F555	B2
F142	C6	F204	D4	F325	G3	F511	B1	F555	B2
F143	D6	F204	D4	F326	E3	F511	B1	F556	B1
F143	D6	F205	C2	F326	E3	F512	B1	F556	B1
F144	D6	F205	C2	F328	E3	F512	B1	F557	C1

Test points overview Digital Board

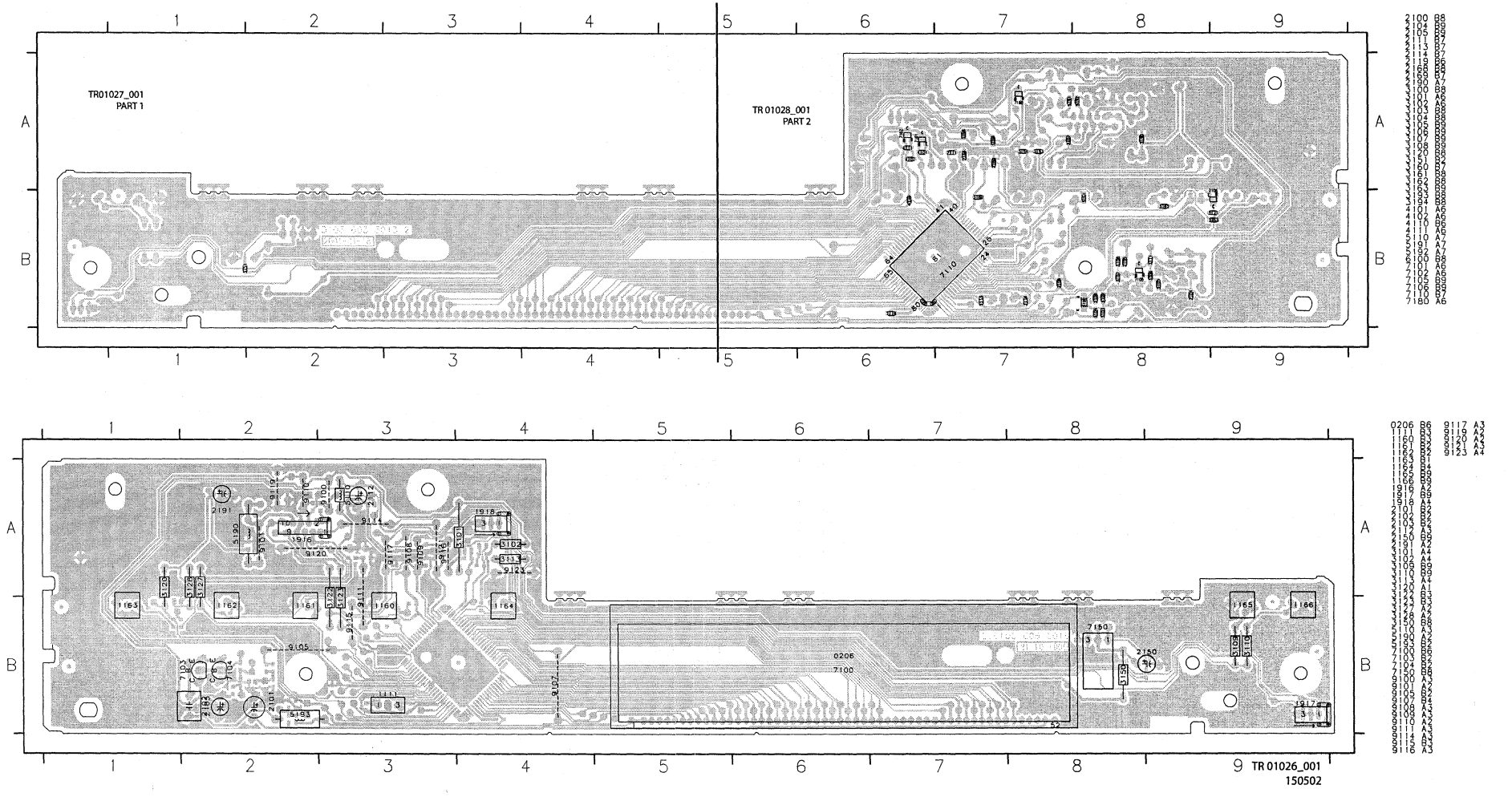


Layout Digital Board (Mapping Testlands)

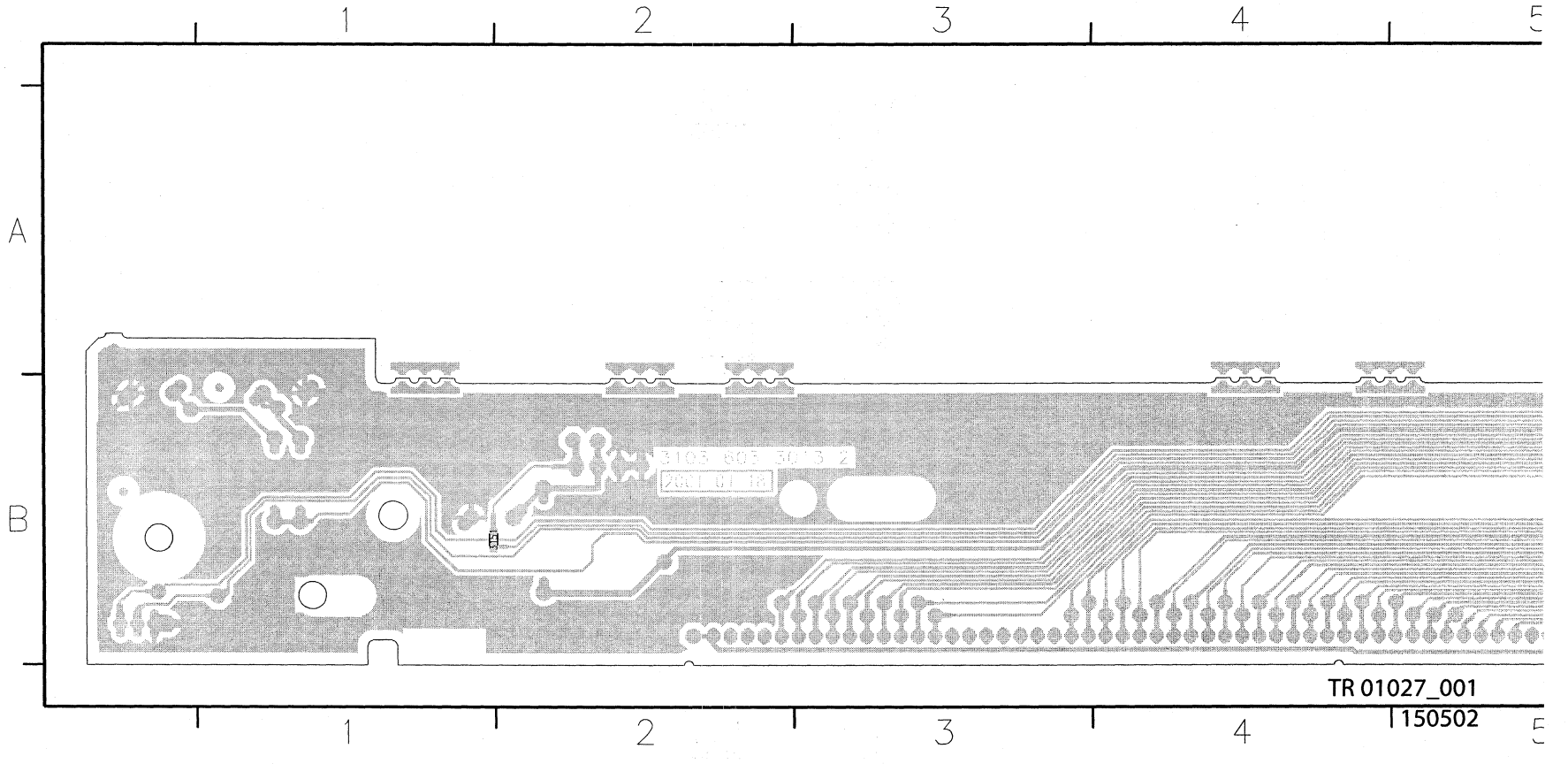
F214	A3	I175	A3	I300	A2	I610	A5	I720	B3	I880	C3				
F247	A2	I176	A3	I301	A2	I611	B5	I721	B2	I881	C3				
F248	A2	I177	A3	I302	A2	I612	A5	I722	B3	I882	C3				
F249	A2	I178	A3	I303	B2	I613	B5	I723	B2	I883	C2				
F250	A2	I179	A3	I304	B3	I614	A5	I724	B2	I884	C2				
F264	A2	I180	A3	I305	B3	I615	B5	I725	B3	I900	B4				
F265	A3	I181	A3	I306	A3	I616	A5	I726	B2	I901	B4				
F931	A4	I182	B3	I307	B3	I617	A5	I727	B2	I902	B4				
F932	A4	I183	A2	I308	A3	I618	C4	I728	A1	I903	B4				
F933	A5	I184	A3	I309	B3	I619	A5	I729	A1	I904	B2				
F934	A4	I186	A3	I400	A4	I621	A1	I730	A1	I905	A4				
F935	A4	I187	A3	I401	A4	I622	A1	I731	A1	I906	A4				
I100	A4	I188	A3	I402	B4	I623	A1	I732	B2	I907	A4				
I101	C5	I200	A2	I403	A4	I624	A1	I733	B2	I908	A5				
I102	C5	I201	B3	I404	B4	I625	A1	I734	B1	I909	B4				
I103	B4	I202	A5	I405	B4	I626	A1	I735	B1	I911	B3				
I104	B4	I203	A3	I406	B4	I627	B4	I800	C4	I912	A3				
I105	B3	I204	C3	I407	A4	I628	C4	I801	C3	I913	B3				
I106	B3	I205	A2	I408	A5	I629	A5	I802	C3	I915	B3				
I107	B3	I206	A4	I409	A4	I630	C4	I803	C3	I916	B3				
I108	B3	I207	A2	I410	A4	I631	C4	I805	C3	I917	B3				
I109	B4	I208	B3	I412	B4	I632	C4	I806	C3	I918	A5				
I110	B3	I209	B4	I413	A4	I633	B4	I807	C3	I919	B3				
I111	A2	I210	A2	I414	B4	I634	C4	I808	C2	I920	B3				
I112	B5	I211	A2	I415	B4	I635	C5	I809	C2	I921	A5				
I113	B5	I212	A2	I416	B4	I636	C4	I810	C3	I922	A5				
I114	B5	I213	A2	I500	C5	I637	C5	I811	C3	I923	B3				
I115	B5	I215	B5	I501	C5	I638	C5	I812	C2	I924	A4				
I116	C3	I216	A1	I502	C5	I639	C5	I813	C2	I925	B3				
I117	C3	I217	A2	I503	C5	I640	C5	I814	C1	I926	A5				
I118	C4	I218	A2	I504	C5	I641	B5	I815	B2	I927	A5				
I119	C4	I219	A1	I505	C5	I642	A5	I816	B2	I928	A5				
I120	A4	I220	A1	I506	C5	I643	A5	I817	B2	I930	B3				
I121	A3	I221	B2	I507	C5	I644	A5	I818	C2	I931	A5				
I122	B3	I222	B2	I508	C5	I645	B5	I819	C3	I932	B2				
I123	A2	I223	A2	I509	C5	I646	C4	I820	C3	I933	B3				
I124	B4	I224	A1	I510	B5	I647	A5	I821	C3						
I125	A2	I225	A2	I511	C4	I649	C5	I822	C3						
I126	A3	I226	A2	I512	C5	I650	B4	I823	C3						
I127	A2	I227	A2	I513	B5	I651	B5	I824	B2						
I128	A4	I228	A2	I514	B4	I652	B5	I825	B2						
I129	A2	I229	B5	I515	C5	I653	B5	I826	C3						
I130	B3	I230	A2	I516	C5	I654	B4	I827	C3						
I131	A3	I231	A2	I517	C5	I655	B4	I828	C3						
I132	B1	I232	A2	I518	C4	I656	B5	I829	C3						
I133	A3	I233	A2	I519	C5	I657	C4	I830	C3						
I134	A3	I234	A4	I520	C4	I658	C4	I831	C3						
I136	A3	I235	A4	I521	C4	I659	C3	I832	C3						
I137	A2	I236	B4	I522	C4	I660	B5	I833	C3						
I138	A3	I237	A2	I523	C4	I661	B5	I834	B3						
I140	A3	I238	A2	I524	C4	I662	C5	I835	B3						
I141	A4	I239	B5	I525	C5	I663	B4	I836	B2						
I142	A3	I240	A4	I526	C5	I664	B5	I837	C3						
I143	B4	I241	B2	I527	C5	I665	C4	I838	C3						
I145	A3	I242	B1	I528	C4	I666	C5	I839	C3						
I147	B4	I243	B1	I529	C5	I667	B5	I840	C3						
I149	B3	I244	A2	I530	C5	I668	B4	I841	C3						
I152	B3	I245	A1	I531	C5	I669	B4	I842	C3						
I153	B5	I246	A2	I532	C5	I670	A5	I843	C2						
I154	B3	I251	A1	I533	C4	I671	B5	I844	C2						
I155	B3	I252	A2	I535	C5	I700	B2	I845	C2						
I156	A3	I253	A2	I536	C4	I701	B1	I846	B3						
I157	A3	I254	A1	I537	C5	I702	B1	I847	B2						
I158	B4	I255	A1	I538	C4	I703	C2	I848	B2						
I159	A5	I256	A2	I540	C5	I704	C2	I849	B2						
I160	B3	I257	C5	I543	C5	I705	C2	I850	B2						
I161	B3	I258	A2	I551	C5	I706	C2	I851	B1						
I162	C4	I259	A2	I552	C4	I707	C2	I852	B1						
I163	A3	I260	A1	I553	C4	I708	C2	I868	C2						
I164	B4	I261	A1	I555	C4	I709	C1	I869	C2						
I165	A3	I262	A1	I600	A5	I710	B3	I870	B2						
I166	B4	I263	A1	I601	A5	I711	C2	I871	C3						
I167	A3	I264	A2	I602	A5	I712	C2	I872	C3						
I168	C5	I265	B5	I603	C5	I713	A1	I873	B2						
I169	A3	I266	A2	I604	A5	I714	C2	I874	C2						
I170	A3	I267	A2	I605	A5	I715	C2	I875	C2						
I171	A3	I268	B2	I606	A5	I716	B3	I876	C3						
I172	A3	I269	B2	I607	A5	I717	B3	I877	C2						
I173	A3	I270	A2	I608	A5	I718	B3	I878	C3						
I174	A3	I271	B1	I609	B5	I719	B3	I879	C3						

CL 16532145-34m.eps
101201

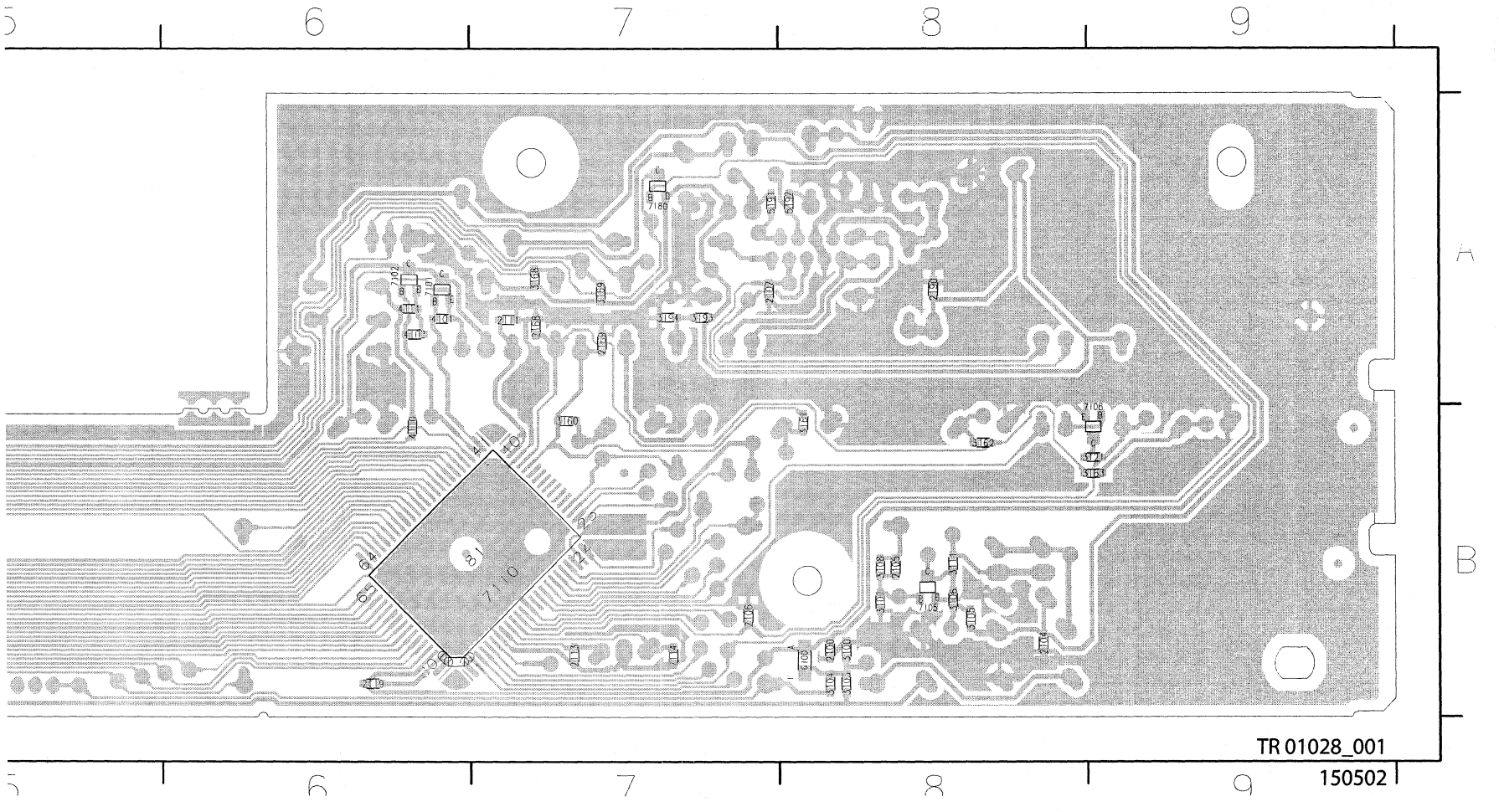
Layout Display Panel (DISP)



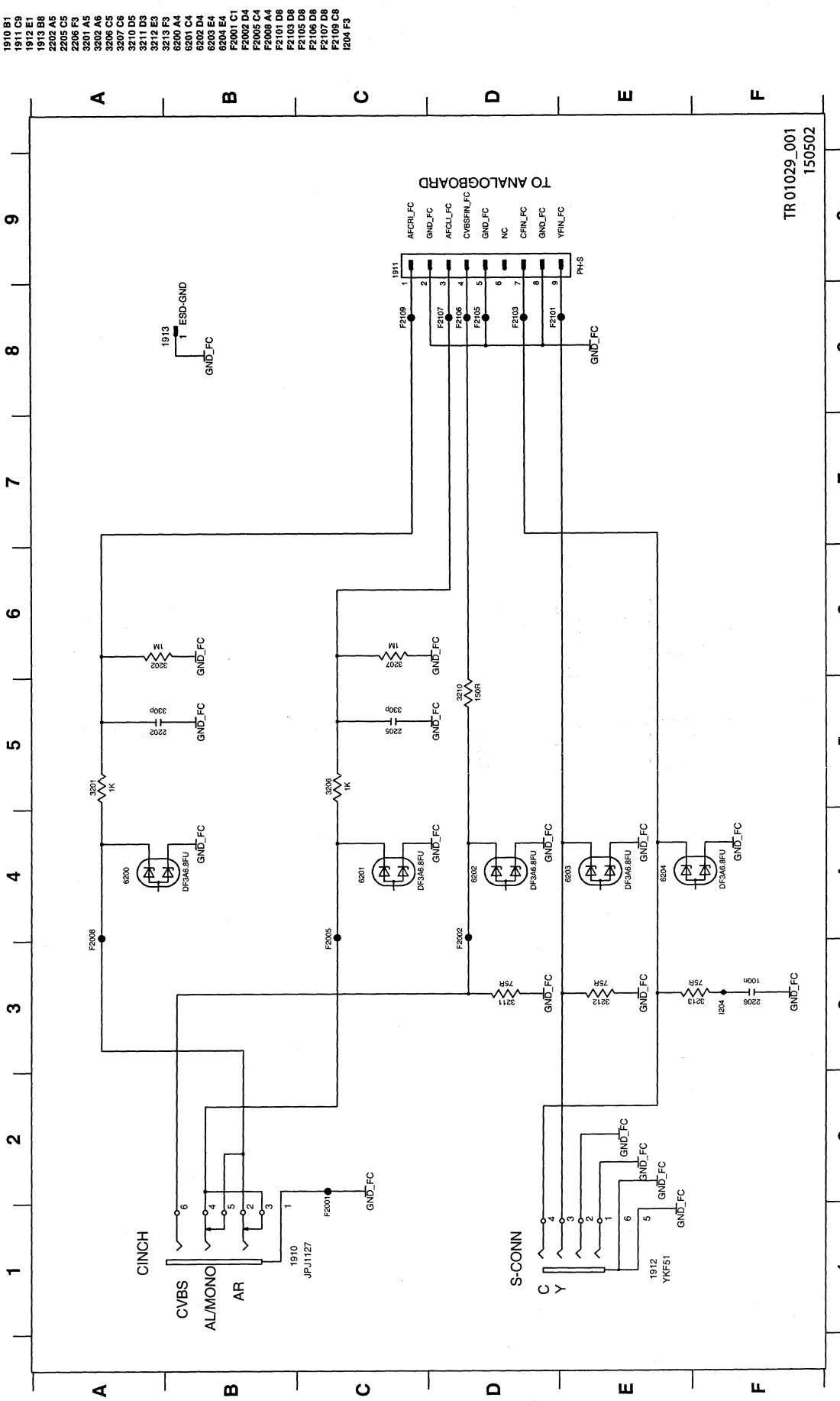
Layout Display Panel (Part 1 Bottom View)



Layout Display Panel (Part 2 Bottom View)

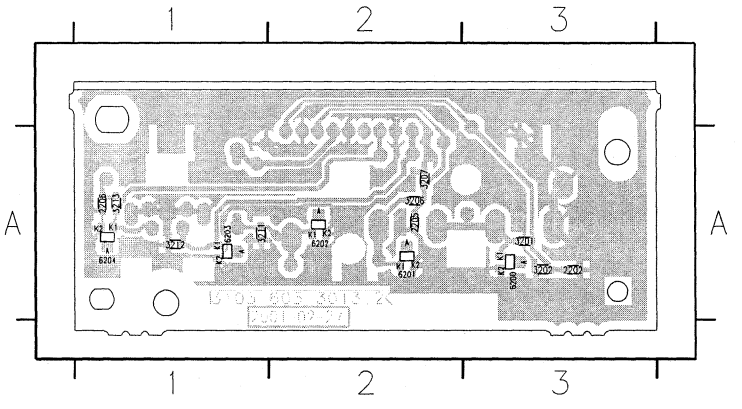


Front Connector Panel (FC)

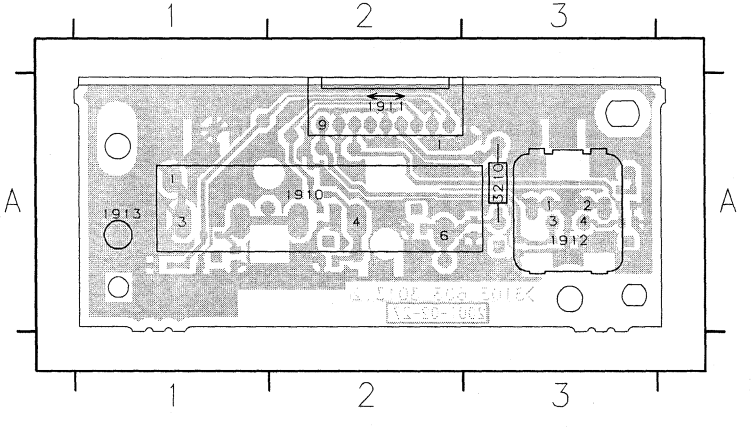


Layout Front Connector Panel (FC)

2200 A2	2205 A2	3203 A3	3208 A3	4201 A3	6202 A2
2201 A3	2206 A1	3204 A3	3209 A3	4202 A2	6203 A1
2202 A3	3200 A3	3205 A2	3211 A2	4203 A3	6204 A1
2203 A3	3201 A3	3206 A2	3212 A1	6200 A3	7200 A3
2204 A3	3202 A3	3207 A3	3213 A1	6201 A2	7201 A2



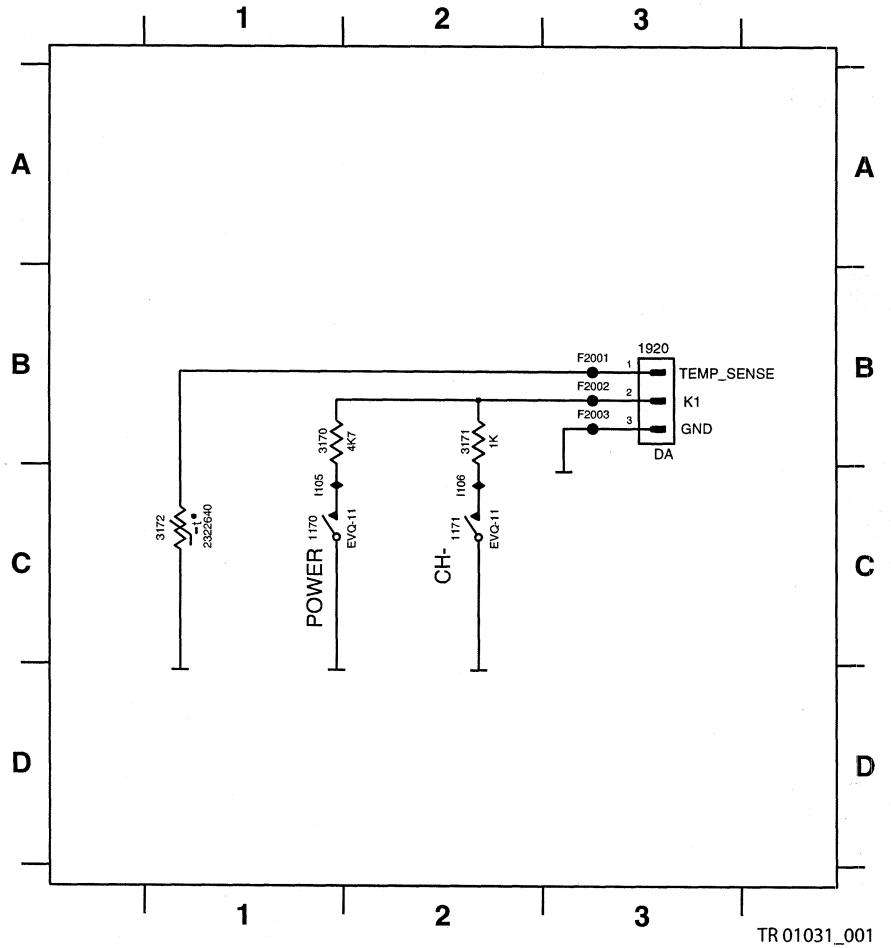
1910 A2 1911 A2 1912 A3 1913 A1 3210 A3



TR 01030_001
150502

Key Panel (KEY)

1170 C1 1920 B3 3171 B2 F2001 B3 F2003 B3 I106 C2
1171 C2 3170 B1 3172 C1 F2002 B3 I105 C1



TR 01031_001
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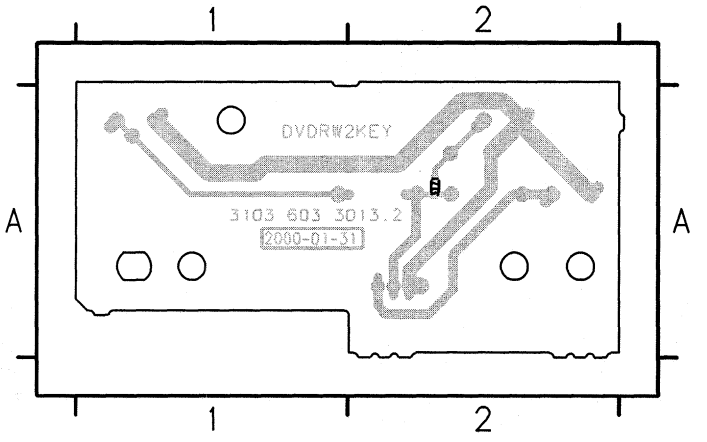
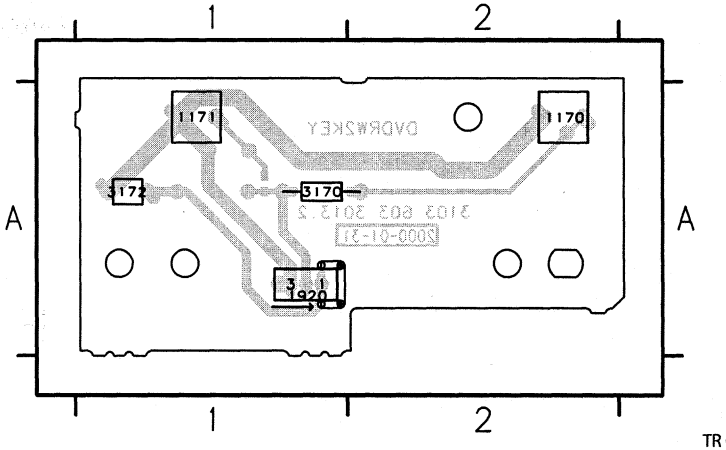
Layout Key Panel (KEY)



3171 A2

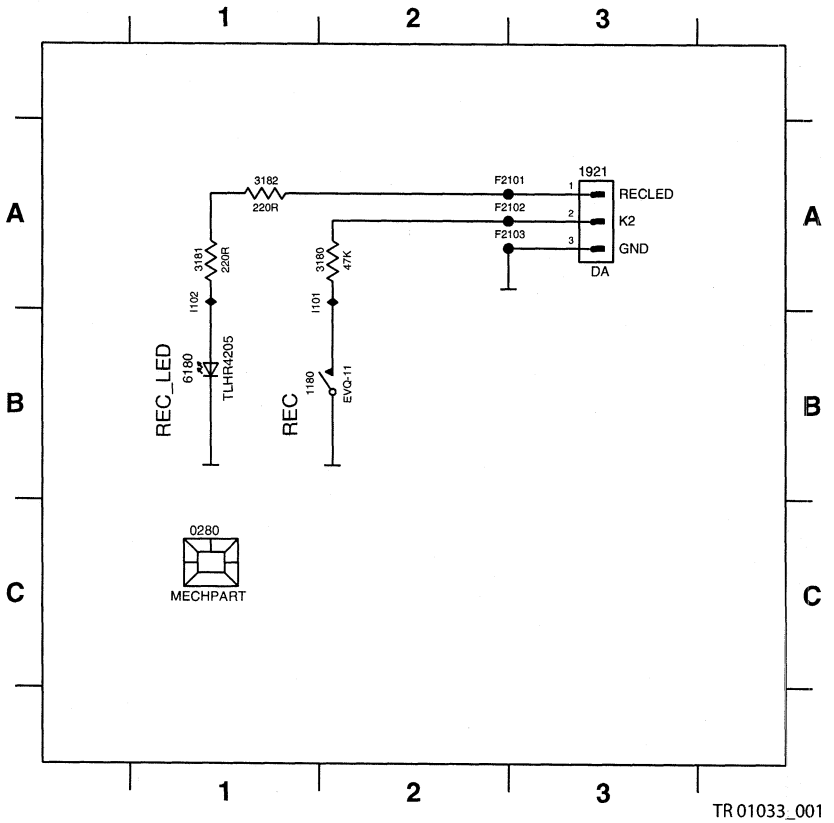


1170 A2
1171 A1
1920 A1
3170 A1
3172 A1

TR 01032_001
150502

Record Key Panel (REC)

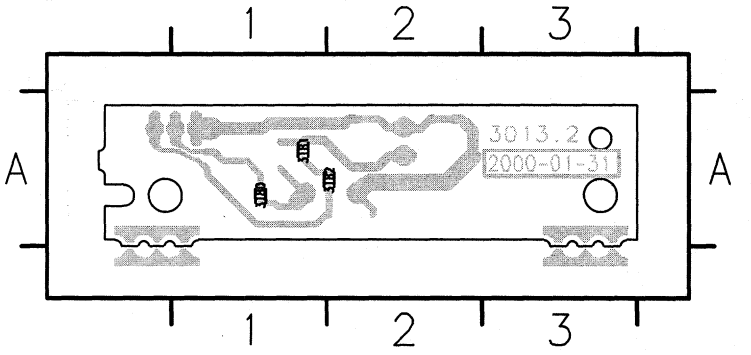
0280 C1 1921 A3 3181 A1 6180 B1 F2102 A3 I101 A1
1180 B1 3180 A2 3182 A1 F2101 A3 F2103 A3 I102 A1



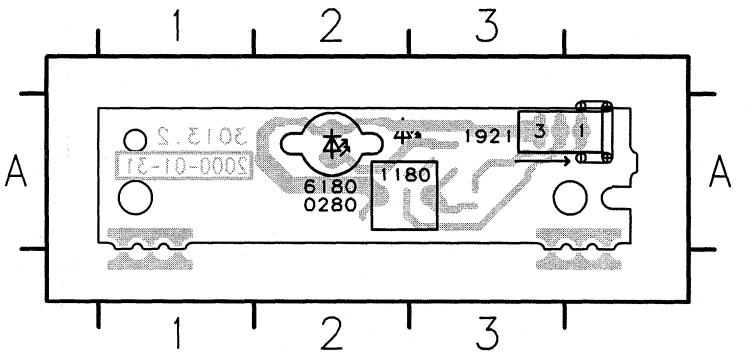
TR 01033_001
150502

Layout Record Key Panel (REC)

3180 A1
3181 A1
3182 A2



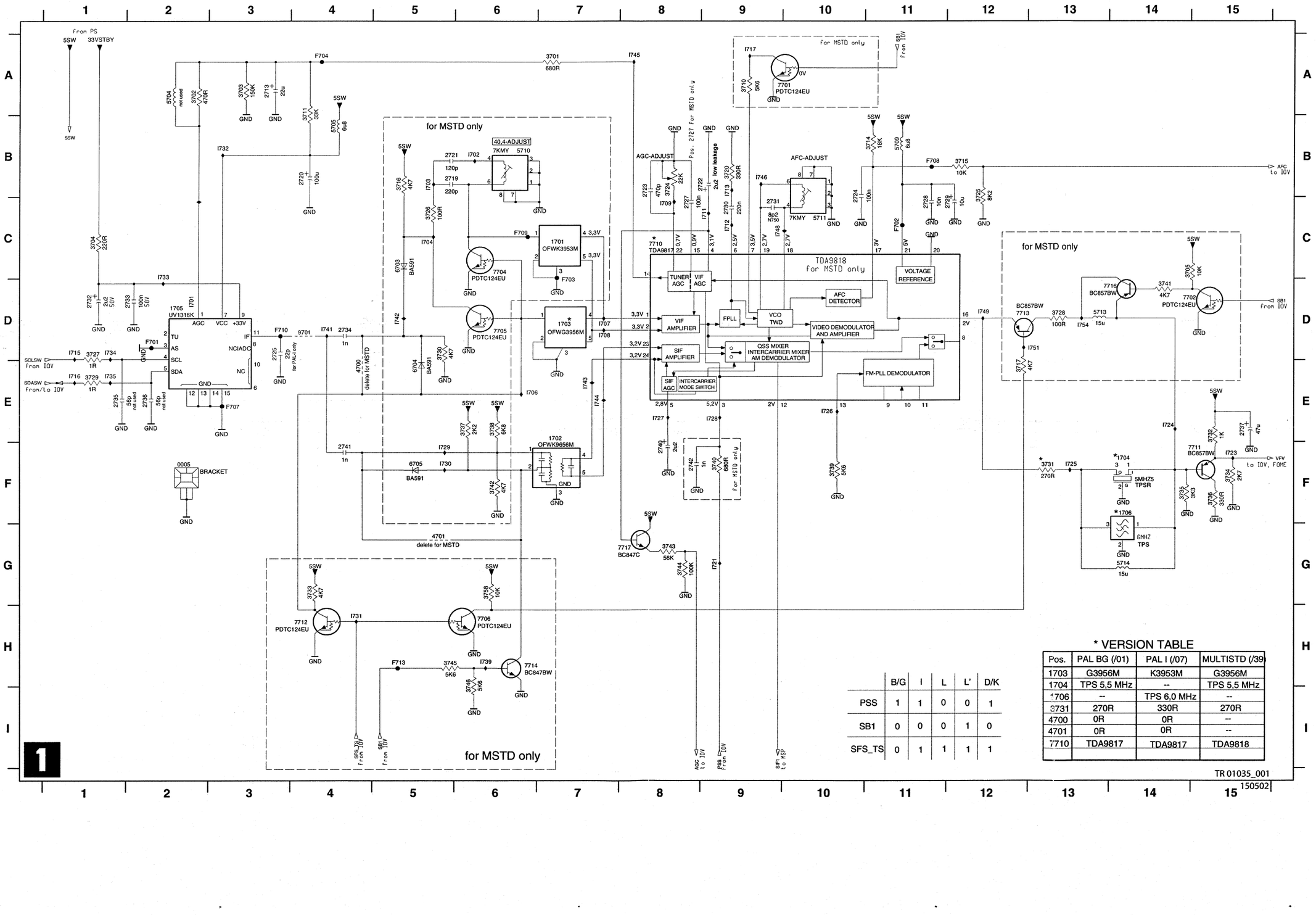
0280 A2
1180 A2
1921 A3
6180 A2



TR 01034_001
150502

Analog Board: Fronted Video (FV)

0005 F2 1701 C7 1702 E7 1703 D7 1704 F14 1705 D2 1706 F14 2713 A3 2719 B5 2720 B4 2721 B5 2722 B9 2723 B8 2724 B10 2725 D3 2727 C8 2728 C11 2729 C12 2730 C9 2731 C9 2732 D1 2733 D2 2734 D4 2735 E1 2736 E2 2737 E15 2740 F8 2741 F4 2742 F8 3701 A7 3702 A2 3703 A3 3704 C1 3705 C14 3710 A9 3711 A4 3714 B11 3715 B12 3716 B5 3717 E12 3720 B9 3724 B8 3725 B12 3726 C5 3727 D1 3728 D13 3729 E1 3730 D5 3731 F13 3732 E15 3733 G4 3734 F15 3735 F14 3736 F15 3737 E6 3738 E6 3739 F10 3740 F9 3741 D14 3742 F6 3743 G8 3744 G8 3745 H5 3746 H6 3758 G6 3760 E4 4701 G5 5704 A2 5705 B4 5709 B11 5710 B6 5711 C10 5713 D13 5714 G14 6703 C5 6704 E5 6705 F5 7701 A10 7702 D15 7704 C6 7705 D6 7706 H6 7710 C8 7711 F14 7712 H4 7713 D12 7714 H6 7716 D14 7717 G7 9701 D4 F701 D2 F702 C11 F703 D7 F704 A4 F707 E3 F708 B11 F709 C6 F710 D3 F713 H5 I701 D2 I702 B6 I703 B5 I704 C5 I706 E6 I707 D7 I708 D6 I709 C6 I711 C9 I712 C9 I713 B9 I715 D1 I716 E1 I717 A9 I721 G9 I723 F15 I724 E14 I725 F13 I726 E10 I727 F5 I728 E9 I729 F5 I730 F5 I731 H4 I732 B3 I733 C2 I734 D1 I735 E1 I739 H6 I741 D4 I742 D5 I743 E7 I744 E7 I745 A8 I746 B9 I748 C9 I749 D12 I751 D13 I754 D13

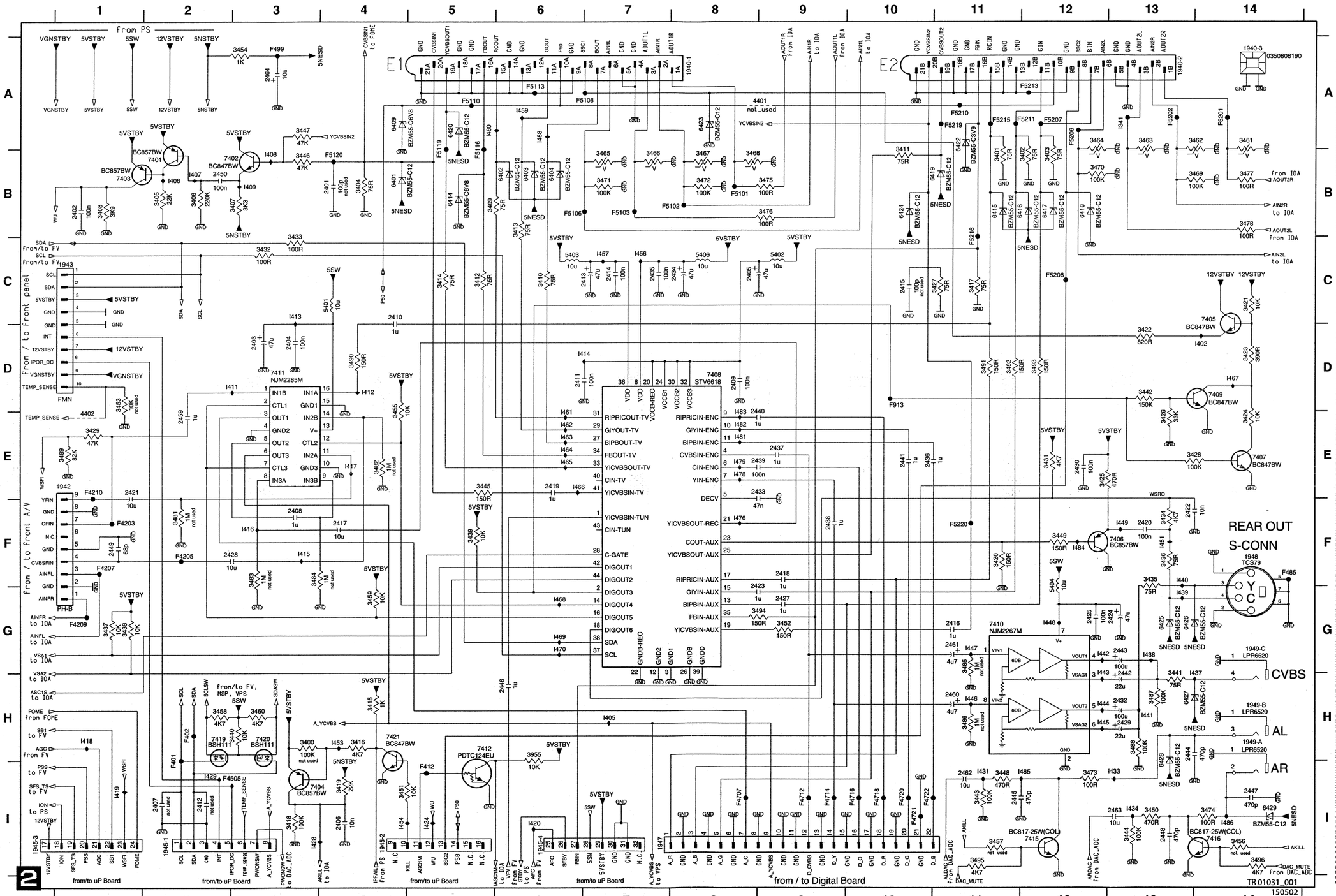


	B/G	I	L	L'	D/K
PSS	1	1	0	0	1
SB1	0	0	0	1	0
SFS_TS	0	1	1	1	1

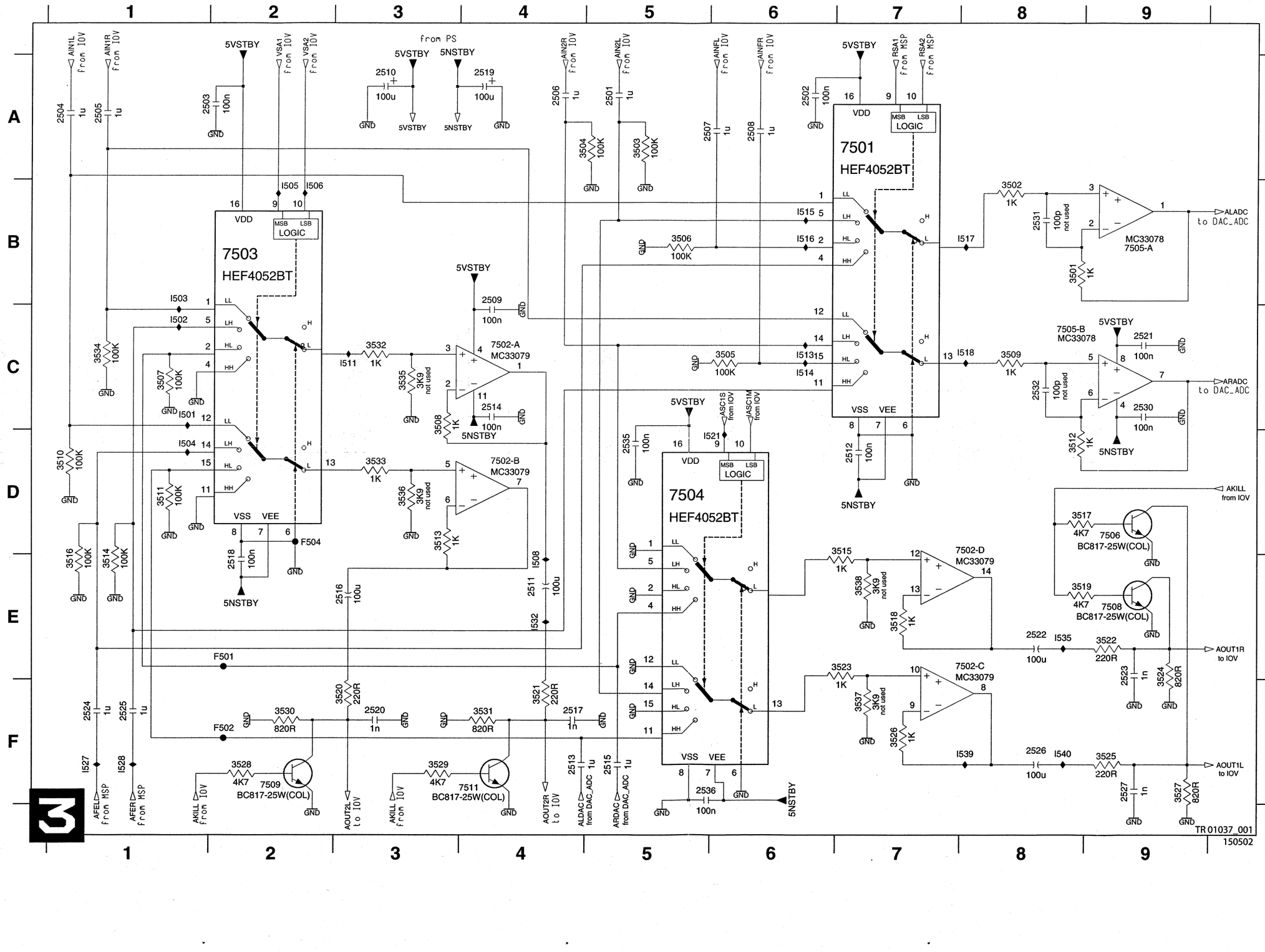
* VERSION TABLE

Pos.	PAL BG (/01)	PAL I (/07)	MULTISTD (/39)
1703	G3956M	K3953M	G3956M
1704	TPS 5,5 MHz	--	TPS 5,5 MHz
1706	--	TPS 6,0 MHz	--
3731	270R	330R	270R
4700	0R	0R	--
4701	0R	0R	--
7710	TDA9817	TDA9817	TDA9818

Analog Board: In/Out Video (IOV)

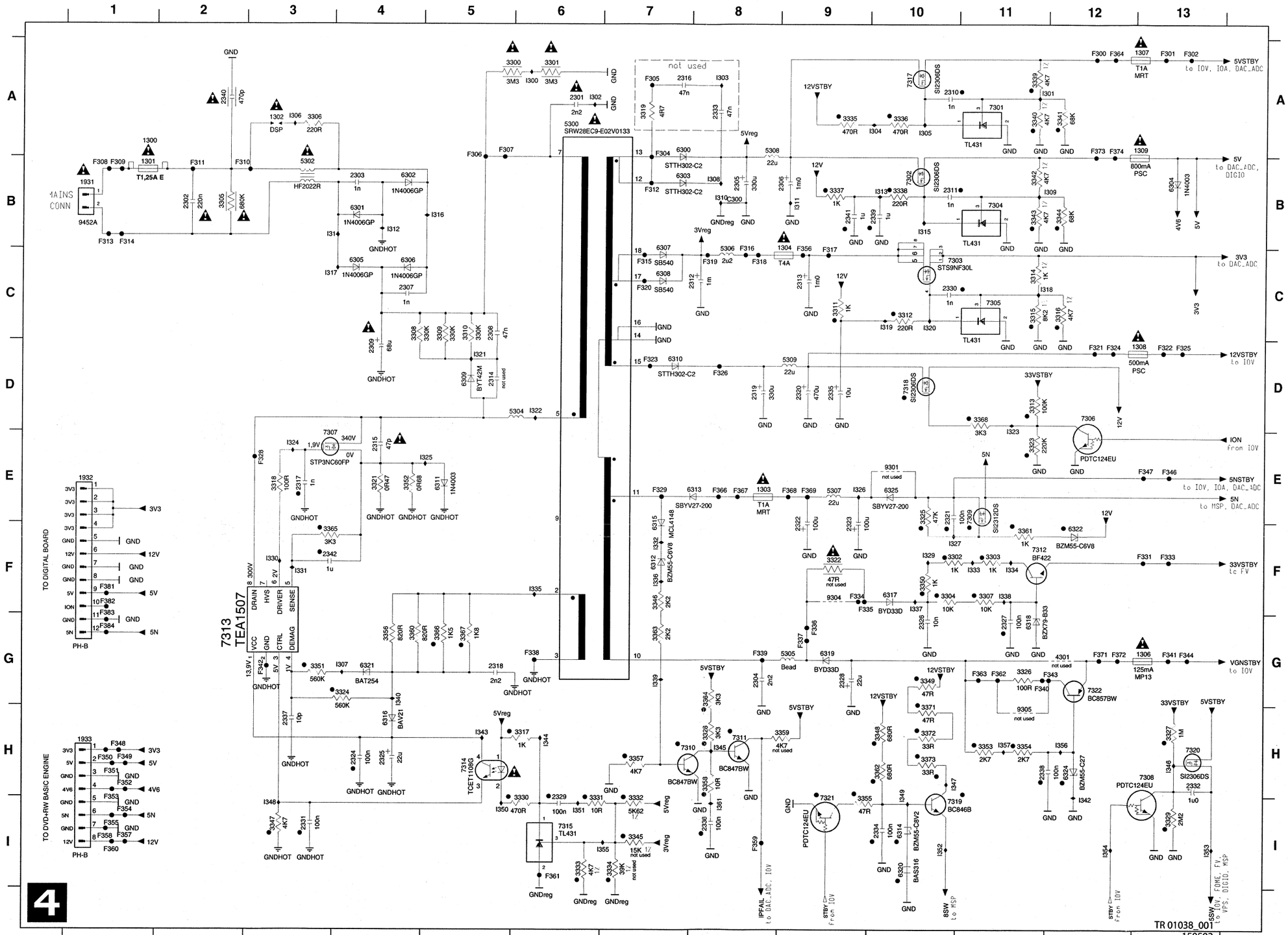


Analog Board: IN/Out Audio (IOA)



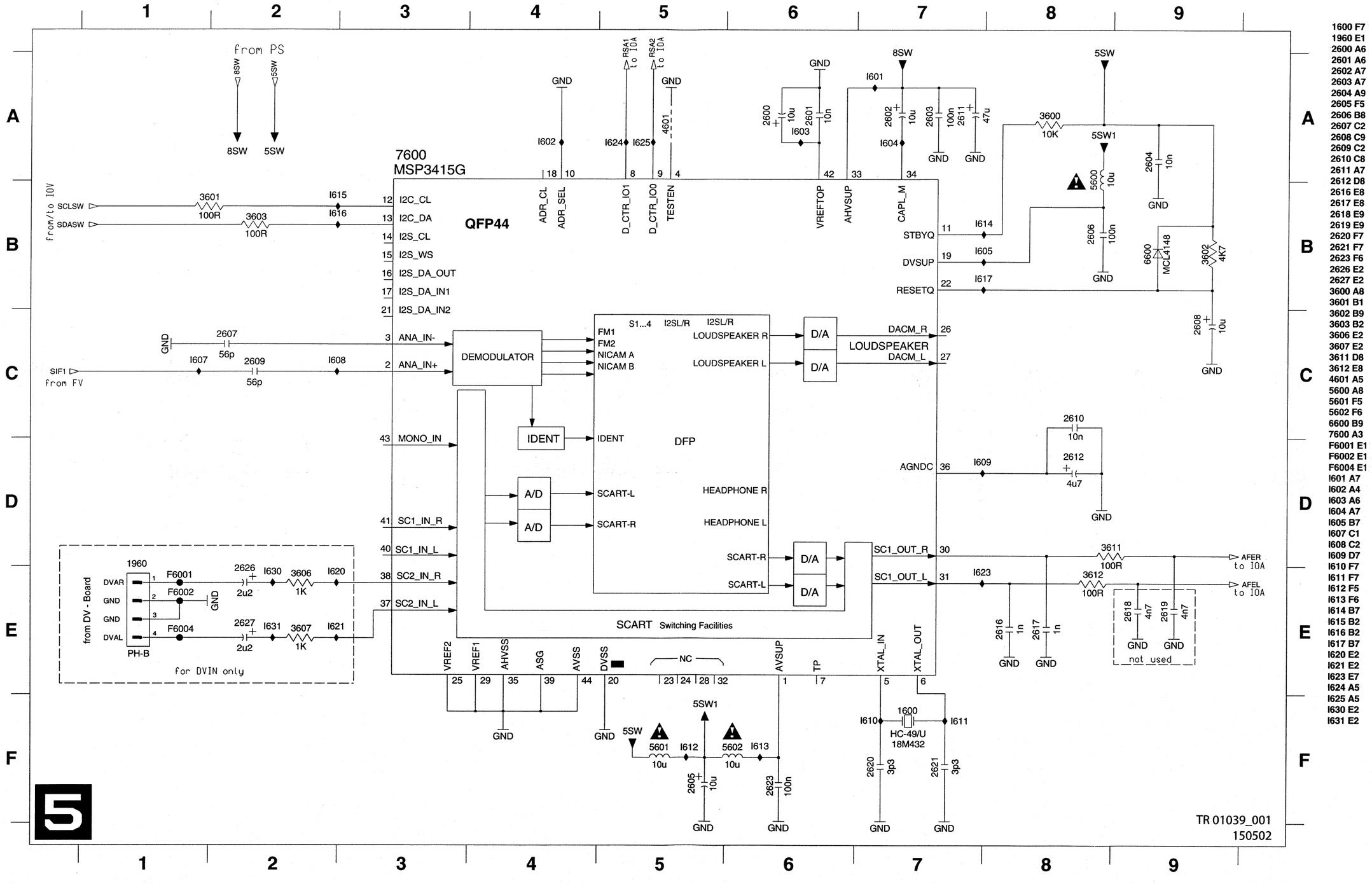
2501 A5 I504 D1
2502 A6 I505 B2
2503 A1 I506 B2
2504 A1 I508 E4
2505 A1 I511 C3
2506 A4 I513 C6
2507 A5 I514 C6
2508 A6 I515 B6
2509 B4 I516 B6
2510 A3 I517 B8
2511 E4 I518 C8
2512 D7 I521 D6
2513 F4 I527 F1
2514 C4 I528 F1
2515 F5 I532 E4
2516 E3 I535 E8
2517 F4 I539 F8
2518 E2 I540 F8
2519 A4
2520 F3
2521 C9
2522 E8
2523 E9
2524 F1
2525 F1
2526 F8
2527 F9
2530 C9
2531 B8
2532 C8
2535 D5
2536 F5
3501 B8
3502 B8
3503 A5
3504 A4
3505 C6
3506 B5
3507 C1
3508 C3
3509 C8
3510 D1
3511 D1
3512 D8
3513 D3
3514 E1
3515 D7
3516 E1
3517 D8
3518 E7
3519 E8
3520 F3
3521 F4
3522 E9
3523 E7
3524 E9
3525 F9
3526 F7
3527 F9
3528 F2
3529 F3
3530 F2
3531 F4
3532 C3
3533 D3
3534 C1
3535 C3
3536 D3
3537 F7
3538 E7
7501 A7
7502-A C4
7502-B D4
7502-C E7
7502-D D7
7503 B2
7504 D5
7505-A B9
7505-B C8
7506 D9
7508 E9
7509 F2
7511 F4
F501 E2
F502 F2
F504 D2
I501 C1
I502 C1
I503 B1

Analog Board: Power Supply (PS)



1300 A1	3365 F3	F357 I1
1301 B1	3366 G5	F358 I1
1302 A3	3367 G5	F359 I8
1303 E8	3368 D11	F360 I1
1304 C9	3371 H10	F361 I6
1306 G13	3372 H10	F362 G11
1307 A13	3373 H10	F363 G11
1308 D13	4301 G12	F364 A12
1309 A13	5300 A6	F366 E8
1931 B1	5302 B3	F367 E8
1932 E1	5304 D6	F368 E9
1933 H1	5305 G9	F369 E9
2301 A6	5306 C8	F371 G12
2302 B2	5307 E9	F372 G12
2303 B4	5308 A8	F373 A12
2304 G8	5309 D9	F374 A12
2305 B8	6300 A7	F381 F1
2306 B9	6301 B4	F382 F1
2307 C4	6302 B4	F383 G1
2308 C5	6303 B7	F384 G1
2309 D4	6304 B13	I300 A6
2310 A10	6305 C4	I301 A11
2311 B10	6306 C4	I302 A6
2312 C8	6307 C7	I303 A8
2313 C9	6308 C7	I304 A10
2314 D5	6309 D5	I305 A10
2315 E4	6310 D7	I306 A3
2316 A7	6311 E5	I307 G4
2317 E3	6312 F7	I308 B8
2318 G5	6313 E8	I309 B12
2319 D8	6314 I10	I310 B8
2320 D9	6315 E7	I311 B9
2321 E10	6316 H4	I312 B4
2322 F9	6317 F10	I313 B10
2323 F9	6318 G11	I314 B3
2324 H4	6319 G9	I315 B10
2325 H4	6320 I10	I316 B5
2326 G10	6321 G4	I317 C3
2327 G11	6322 F12	I318 C11
2328 G9	6324 H12	I319 C10
2329 I6	6325 E10	I320 C10
2330 C10	7301 A11	I321 D5
2331 I3	7302 B10	I322 D6
2332 H13	7303 C10	I323 D11
2333 A8	7304 B11	I324 E3
2334 I10	7305 C11	I325 E5
2335 D9	7306 D12	I326 E9
2336 I8	7307 E3	I327 F10
2337 H3	7308 H13	I329 F10
2338 H11	7309 E11	I330 F3
2339 B10	7310 H7	I331 F3
2340 A2	7311 H8	I332 F7
2341 B9	7312 F11	I333 F11
2342 F3	7313 G2	I334 F11
3300 A5	7314 H5	I335 F6
3301 A6	7315 I6	I336 F7
3302 F10	7317 A10	I337 F10
3303 F11	7318 D10	I338 F11
3304 F10	7319 I10	I339 G7
3305 B2	7320 H13	I340 G4
3306 A3	7321 I9	I342 I12
3307 F11	7322 G12	I343 H5
3308 C4	9301 E10	I344 H6
3309 C5	9304 F9	I345 H8
3310 C5	9305 H11	I346 H13
3311 C9	C300 B8	I347 H10
3312 C10	F300 A12	I348 I3
3313 D11	F301 A13	I349 H10
3314 C11	F302 A13	I350 I5
3315 C11	F304 A7	I351 I6
3316 C12	F305 A7	I352 I10
3317 H6	F306 B5	I353 I13
3318 E3	F307 A5	I354 I12
3319 A7	F308 B1	I355 I7
3321 E4	F309 B1	I356 H12
3322 F9	F310 B2	I357 H11
3323 E11	F311 B2	I361 I8
3324 G4	F312 B7	
3325 E10	F313 B1	
3326 G11	F314 B1	
3327 H13	F315 C7	
3328 H8	F316 C8	
3329 I13	F317 C9	
3330 I6	F318 C8	
3331 I6	F319 C8	
3332 I7	F320 C7	
3333 I6	F321 D12	
3334 I7	F322 D13	
3335 A9	F323 D7	
3336 A10	F324 D12	
3337 B9	F325 D13	
3338 B10	F326 D8	
3339 A11	F328 E3	
3340 A11	F329 E7	
3341 A12	F331 F13	
3342 B11	F333 F13	
3343 B11	F334 F9	
3344 B12	F335 F9	
3345 I7	F336 G9	
3346 F7	F337 G9	
3347 I3	F338 G6	
3348 H10	F339 G8	
3349 G10	F340 G11	
3350 F10	F341 G13	
3351 G3	F342 G3	
3352 E4	F343 G12	
3353 H11	F344 G13	
3354 H11	F346 E13	
3355 I9	F347 E13	
3356 G4	F348 H1	
3357 H7	F349 H1	
3358 H8	F350 H1	
3359 H9	F351 H1	
3360 G4	F352 H1	
3361 F11	F353 I1	
3362 H10	F354 I1	
3363 G7	F355 I1	
3364 G8	F356 C9	

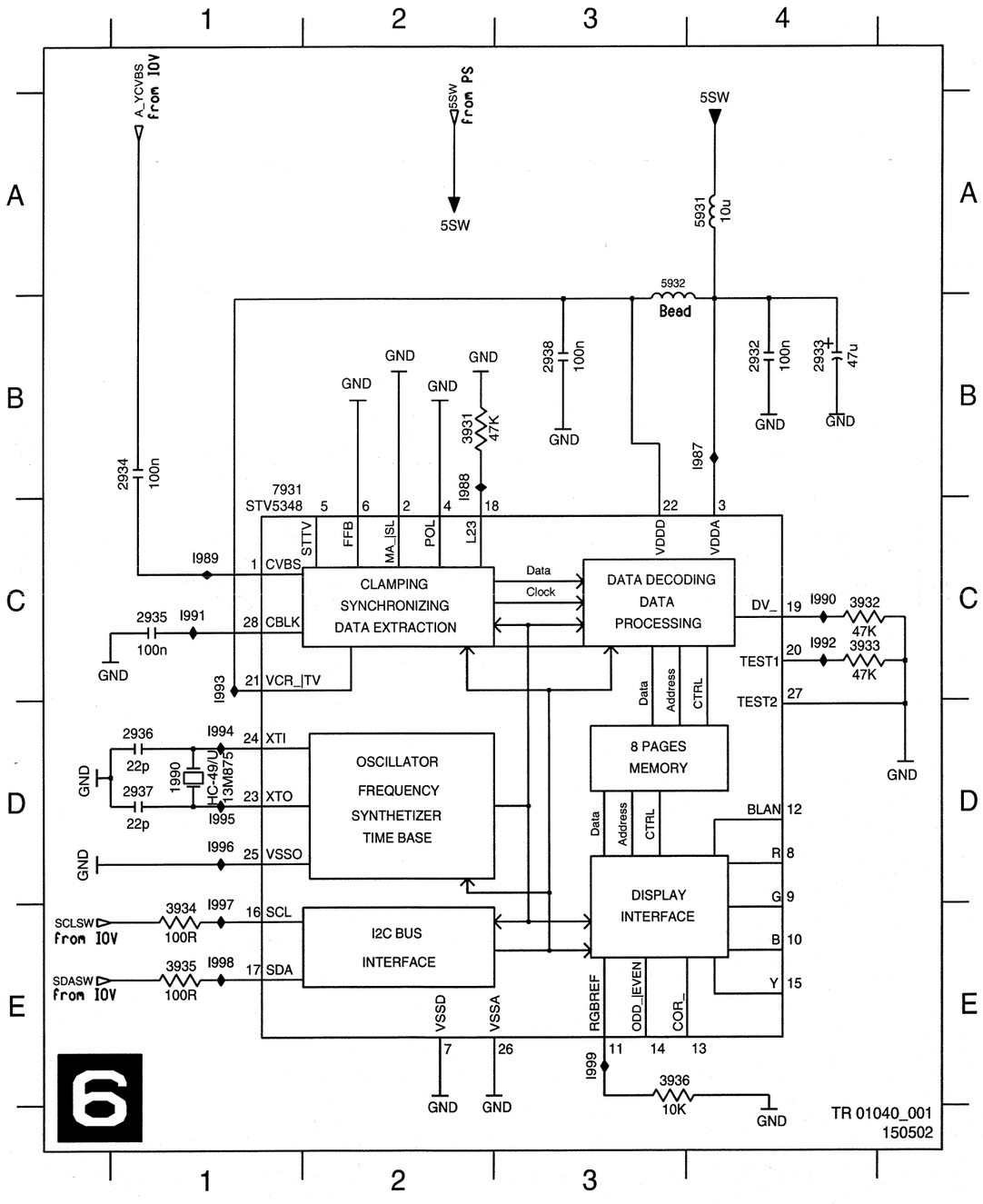
Analog Board: Multi Sound Processing (MSP)



1600 F7
1960 E1
2600 A6
2601 A6
2602 A7
2603 A7
2604 A9
2605 F5
2606 B8
2607 C2
2608 C9
2609 C2
2610 C8
2611 A7
2612 D8
2616 E8
2617 E8
2618 E9
2619 E9
2620 F7
2621 F7
2623 F6
2626 E2
2627 E2
3600 A8
3601 B1
3602 B9
3603 B2
3606 E2
3607 E2
3611 D8
3612 E8
4601 A5
5600 A8
5601 F5
5602 F6
6600 B9
7600 A3
F6001 E1
F6002 E1
F6004 E1
I601 A7
I602 A4
I603 A6
I604 A7
I605 B7
I607 C1
I608 C2
I609 D7
I610 F7
I611 F7
I612 F5
I613 F6
I614 B7
I615 B2
I616 B2
I617 B7
I620 E2
I621 E2
I623 E7
I624 A5
I625 A5
I630 E2
I631 E2

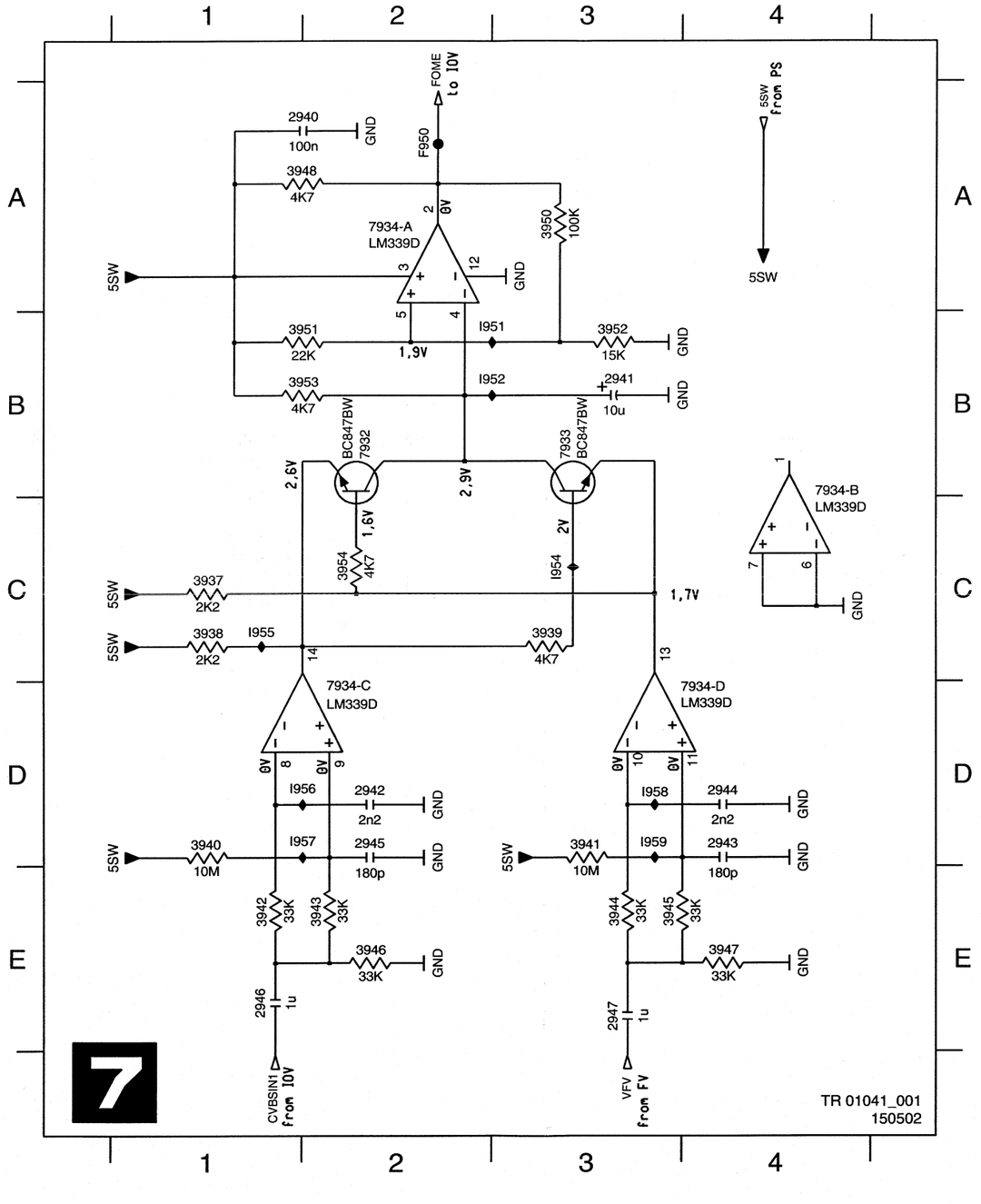
Analog Board: VPS (VPS)

1990 D1 2934 B1 2937 D1 3932 C4 3935 E1 5932 A3 I988 B2 I991 C1 I994 D1 I997 E1
2932 B4 2935 C1 2938 B3 3933 C4 3936 E3 7931 B2 I989 C1 I992 C4 I995 D1 I998 E1
2933 B4 2936 D1 3931 B2 3934 E1 5931 A4 I987 B4 I990 C4 I993 C1 I996 D1 I999 E3



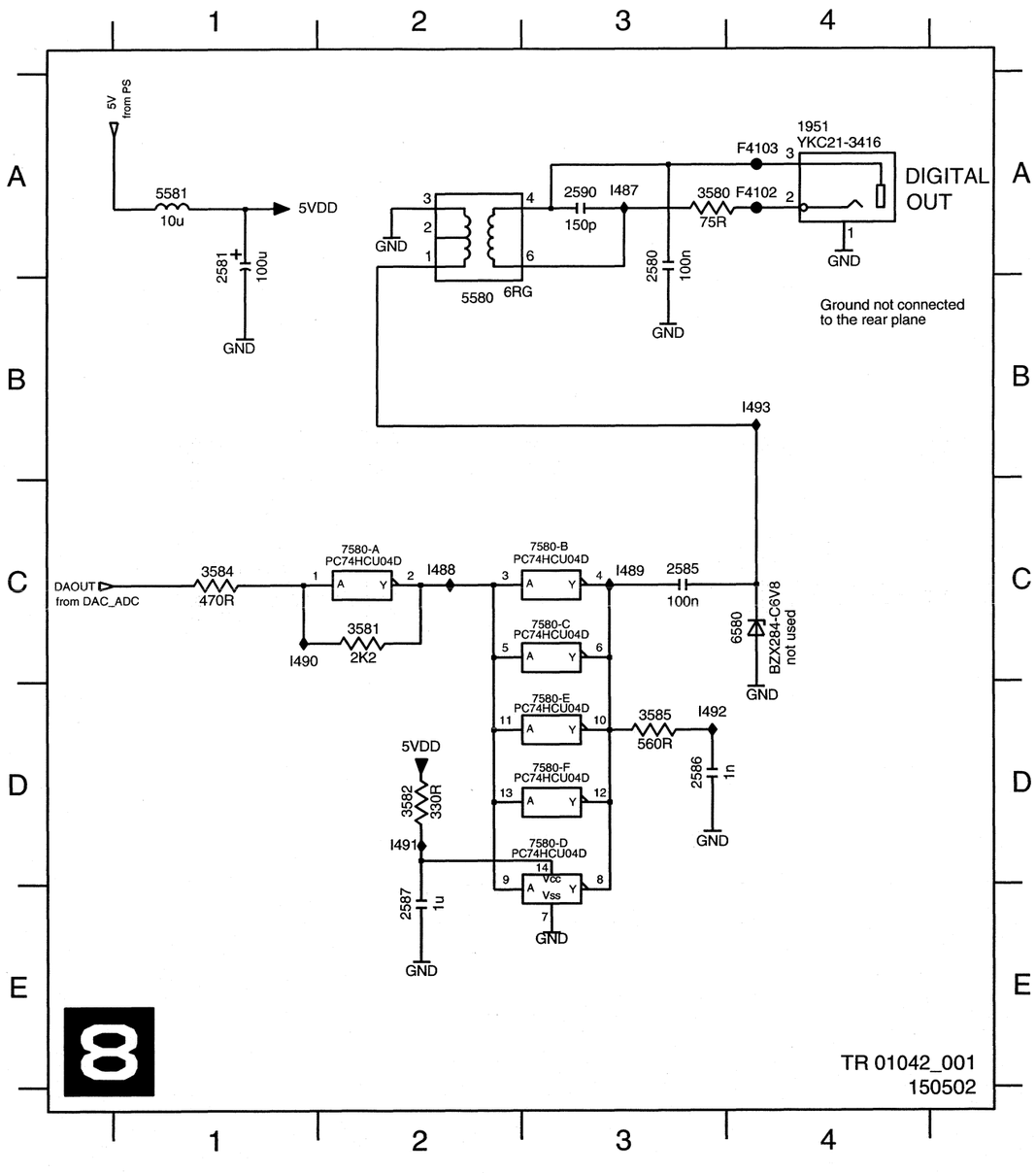
Analog Board: Follow Me (FOME)

2940 A2 2944 D4 3937 C1 3941 D3 3945 E3 3950 A3 3954 C2 7934-B B4 I951 B3 I956 D2
2941 B3 2945 D2 3938 C1 3942 E1 3946 E2 3951 B2 7932 B2 7934-C C2 I952 B3 I957 D2
2942 D2 2946 E1 3939 C3 3943 E2 3947 E4 3952 B3 7933 B3 7934-D D3 I954 C3 I958 D3
2943 D4 2947 E3 3940 D1 3944 E3 3948 A1 3953 B2 7934-A A2 F950 A2 I955 C1 I959 D3

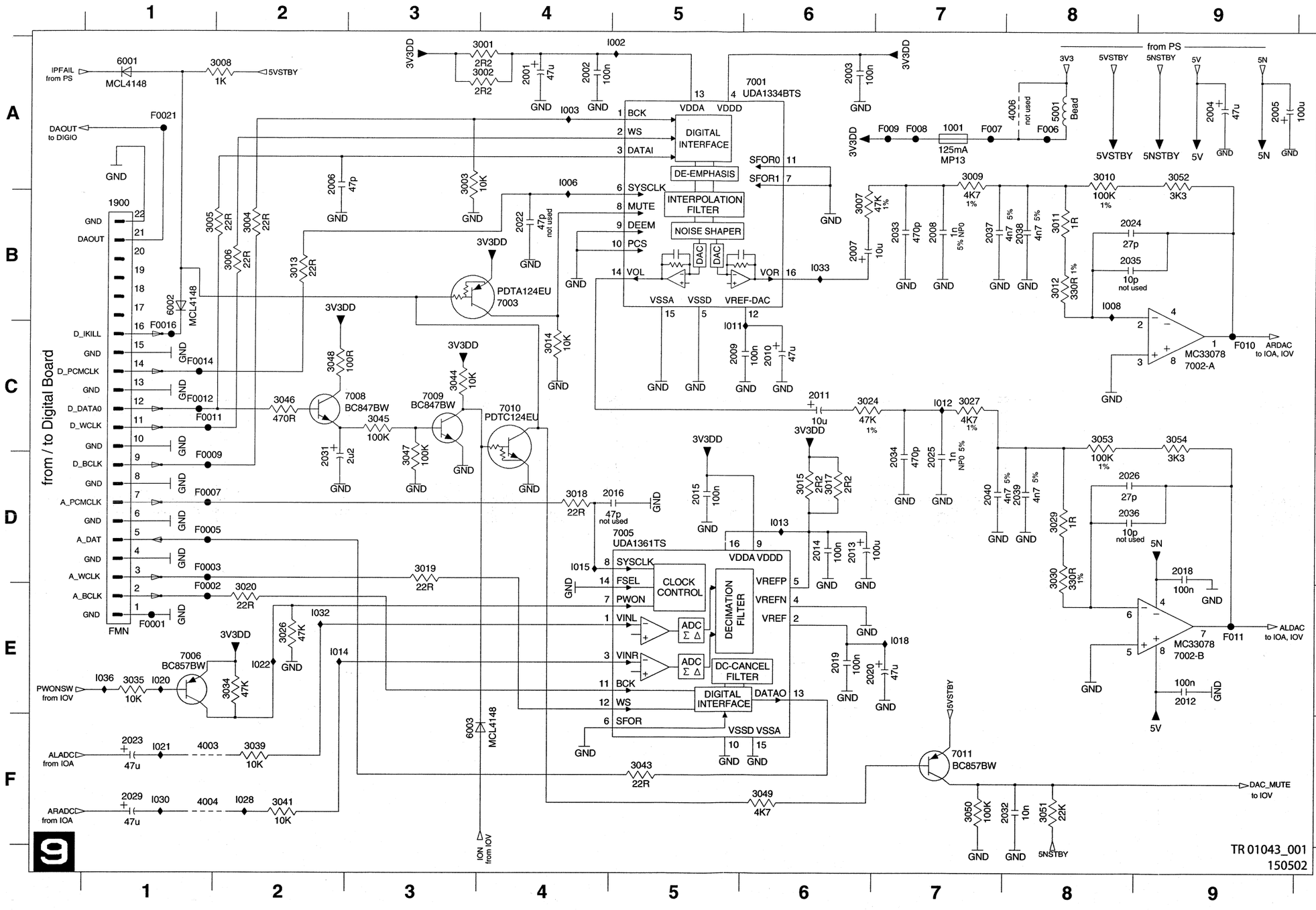


Analog Board: Digital In/Out (DIGIO)

1951 A4	2585 C3	2590 A3	3582 D2	5580 B2	7580-A C2	7580-D D3	F4102 A4	I488 C2	I491 D2
2580 A3	2586 D3	3580 A3	3584 C1	5581 A1	7580-B C3	7580-E D3	F4103 A4	I489 C3	I492 D3
2581 A1	2587 E2	3581 C2	3585 D3	6580 C4	7580-C C3	7580-F D3	I487 A3	I490 C1	I493 B4



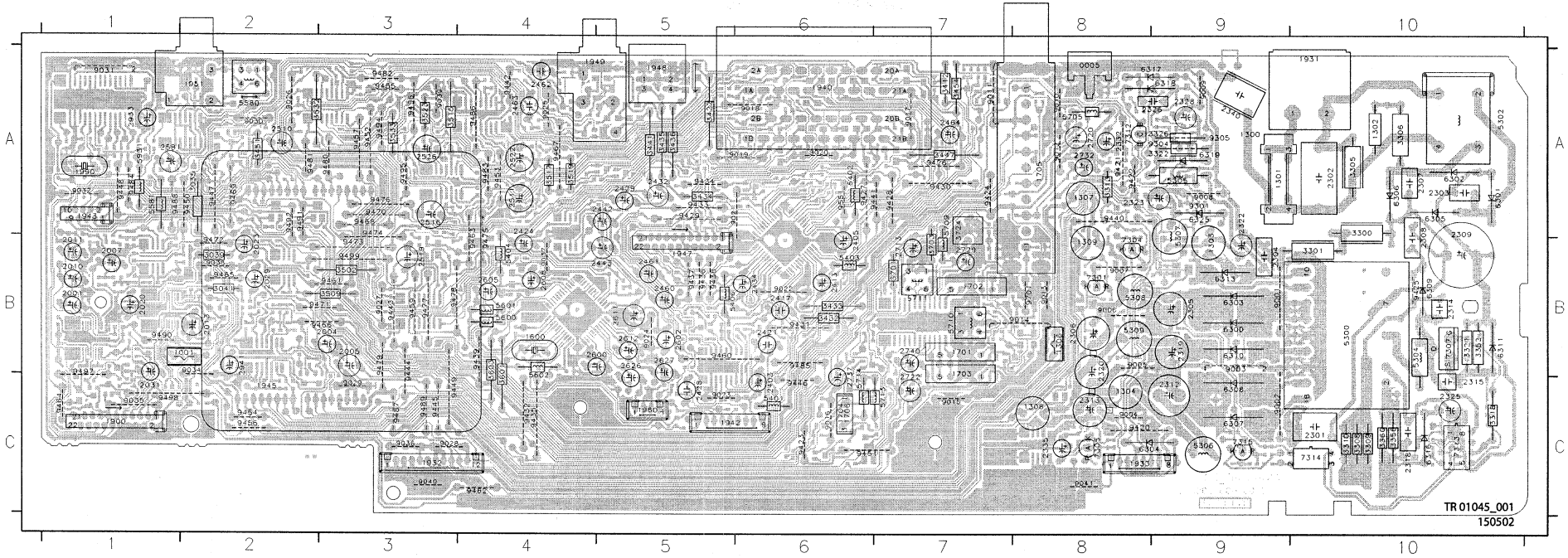
Analog Board: Audio Converter(DAC_ADC)



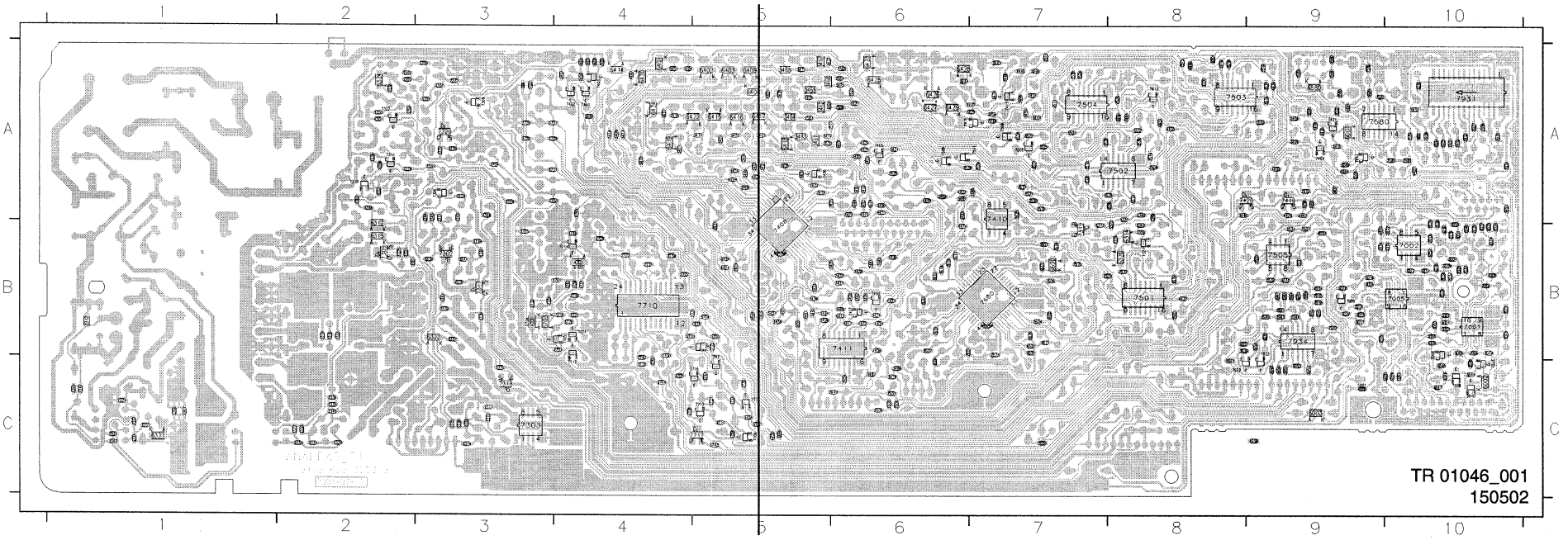
1001 A7	4003 F1
1900 B1	4004 F1
2001 A4	4006 A8
2002 A4	5001 A8
2003 A6	6001 A1
2004 A9	6002 B1
2005 A9	6003 F3
2006 A2	7001 A6
2007 B6	7002-A C9
2008 B7	7002-B E9
2009 C5	7003 B4
2010 C6	7005 D5
2011 C6	7006 E1
2012 E9	7008 C2
2013 D6	7009 C3
2014 D6	7010 C4
2015 D5	7011 F6
2016 D5	F0001 E1
2018 D9	F0002 E1
2019 E6	F0003 D1
2020 E7	F0005 D1
2022 B4	F0007 D1
2023 F1	F0009 D1
2024 B8	F0011 C1
2025 D7	F0012 C1
2026 D8	F0014 C1
2029 F1	F0016 C1
2031 D2	F0021 A1
2032 F7	F006 A8
2033 B7	F007 A7
2034 D7	F008 A7
2035 B8	F009 A7
2036 D8	F010 C9
2037 B7	F011 E9
2038 B8	I002 A5
2039 D8	I003 A4
2040 D7	I006 A4
3001 A4	I008 B8
3002 A4	I011 C5
3003 A3	I012 C7
3004 B2	I013 D6
3005 B1	I014 E2
3006 B2	I015 D4
3007 B6	I018 E7
3008 A2	I020 E1
3009 A7	I021 F1
3010 A8	I022 E2
3011 B8	I028 F2
3012 B8	I030 F1
3013 B2	I032 E2
3014 C4	I033 B6
3015 D6	I036 E1
3017 D6	
3018 D4	
3019 D3	
3020 E2	
3024 C6	
3026 E2	
3027 C7	
3029 D8	
3030 D8	
3034 E2	
3035 E1	
3039 F2	
3041 F2	
3043 F5	
3044 C3	
3045 C3	
3046 C2	
3047 D3	
3048 C2	
3049 F6	
3050 F7	
3051 F7	
3052 A9	
3053 C8	
3054 C9	

Layout Analog Board (Top View)

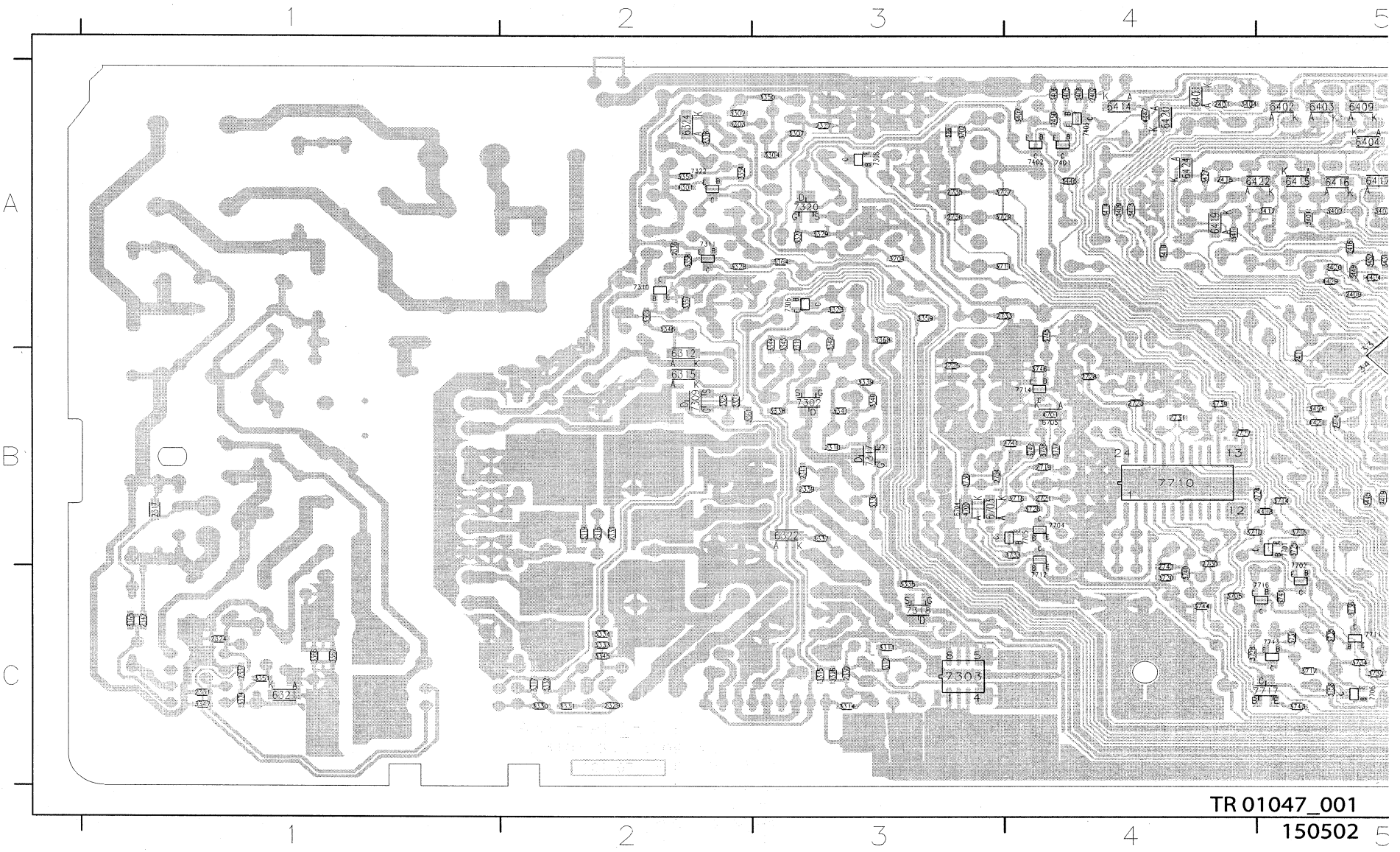
0005 A8 1702 B7 1947 B5 2020 B1 2312 C9 2335 C8 2443 B5 2600 B5 2737 C6 3310 C10 3434 A5 3532 A2 5308 B8 5709 A7 6307 C9 7305 C8 9008 A9 9021 A5 9035 C1 9423 C6 9436 B5 9449 C3 9463 B4 9476 A3 9489 C3
1001 B7 1703 B7 1948 A5 2053 B2 2313 C8 2340 C9 2460 B5 2602 B5 2738 B7 3311 A6 3435 A5 3535 A3 5309 B8 5710 B7 6308 C9 7307 B10 9003 B6 9036 C1 9424 A9 9437 B5 9450 A2 9464 C1 9477 B3 9490 B1
1300 A9 1704 C6 1949 A4 2054 B2 2314 B10 2400 B6 2461 B5 2603 B4 2739 B7 3312 A8 3436 A5 3600 B4 5401 C6 5711 B7 6309 B10 9004 A8 9010 A8 9023 C5 9037 B2 9425 B10 9438 B5 9451 C6 9465 B3 9478 B3 9491 A2
1301 A9 1705 A8 1957 A2 2053 C1 2315 C10 2401 B6 2462 A4 2608 B4 2740 B7 3313 A8 3441 A5 3601 B4 5402 A6 5712 C7 6310 B9 9011 A7 9024 B5 9038 B2 9426 A7 9439 B4 9452 A3 9466 B3 9479 B3 9492 A2
1302 A10 1706 C6 1960 C5 2301 C10 2318 C10 2413 B6 2463 A4 2611 B5 3035 A2 3322 A8 3447 A7 3501 B7 5403 B6 5714 C6 6311 B10 9012 A8 9025 A4 9039 A3 9427 A6 9440 A6 9453 A2 9467 A4 9480 A3 9493 A3
1303 B9 1900 C1 1990 A1 2302 A10 2319 B9 2417 B6 2464 A7 2612 B5 3036 B5 3356 A8 3451 A7 3502 B7 5404 B5 5715 C9 6312 A8 9013 B8 9026 B5 9040 C3 9428 A5 9441 A6 9454 C3 9468 A3 9481 A3 9494 A3
1304 C8 1931 A10 2001 B1 2303 A10 2320 B8 2421 B6 5510 A2 2626 B6 3047 B5 3355 B10 3454 A7 3722 B7 5406 B5 6300 B9 6316 C10 9001 B9 9014 B8 9027 B5 9041 C3 9429 A5 9442 A4 9455 A3 9469 A3 9482 A3 9495 A3
1305 B8 1932 C8 2005 B3 2304 B9 2321 A9 2424 A4 2511 A4 2627 B5 3500 A10 3506 C10 5500 B10 5580 A7 6301 A10 6317 A8 9002 B9 9015 C7 9028 C3 9042 C3 9301 A9 9430 A7 9443 B3 9456 C3 9470 A3 9483 A4 9496 B1
1307 A8 1933 C8 2006 B3 2305 B8 2322 A8 2428 C5 2512 A4 2713 B7 3501 B10 3560 C10 5502 A10 5581 A1 6302 A10 6318 A9 9003 B9 9016 C6 9029 C3 9043 C3 9302 A9 9431 B6 9444 B3 9457 A3 9471 B3 9484 A1 9497 B1
1308 C8 1940 A6 2007 B1 2306 B8 2323 C10 2429 A5 2519 B3 2720 A8 3502 A10 3414 A7 5504 B10 5600 B4 6303 B9 6319 A9 9004 C8 9017 A7 9030 A2 9305 A9 9432 C4 9445 C3 9458 B3 9472 B3 9485 B6 9498 B3
1309 B8 1942 C5 2010 B1 2307 A10 2326 A9 2431 A5 2520 B3 2729 A8 3503 A10 3415 A6 5505 A9 5601 B4 6304 C8 6320 A9 9005 B8 9018 A6 9031 A1 9420 C8 9433 A5 9446 C6 9459 B3 9473 B3 9486 A4 9499 B3
1600 B4 1943 A1 2011 B1 2308 B10 2328 A9 2434 B6 2556 A3 2725 B7 3308 C10 3433 B6 3523 A3 5506 C9 5602 C4 6305 A10 7301 B8 9006 B8 9019 A6 9032 A1 9421 A8 9434 A5 9447 A2 9460 B3 9474 A3 9487 C3 9701 B8
1701 B7 1945 C2 2013 B2 2309 A10 2332 A8 2442 A5 2581 A1 2732 A8 3309 C10 3433 B6 3523 A3 5307 A9 5705 A8 6306 A10 7304 B8 9007 B8 9020 A6 9034 B2 9422 A8 9435 C4 9448 A1 9461 B3 9475 B4 9488 A1 9702 B8



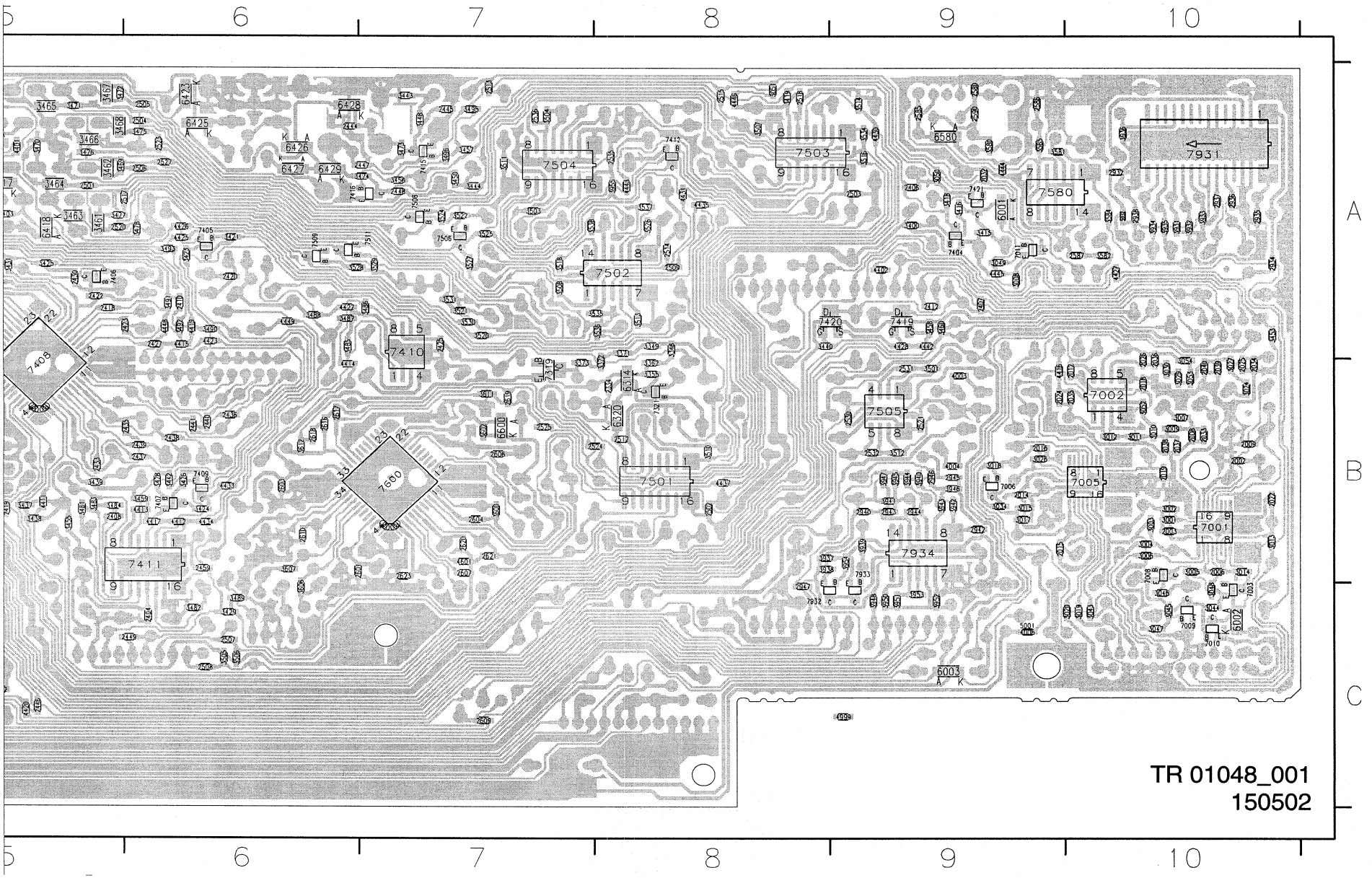
Layout Analog Board (Overview Bottom View)



Layout Analog Board (Part 1 Bottom View)

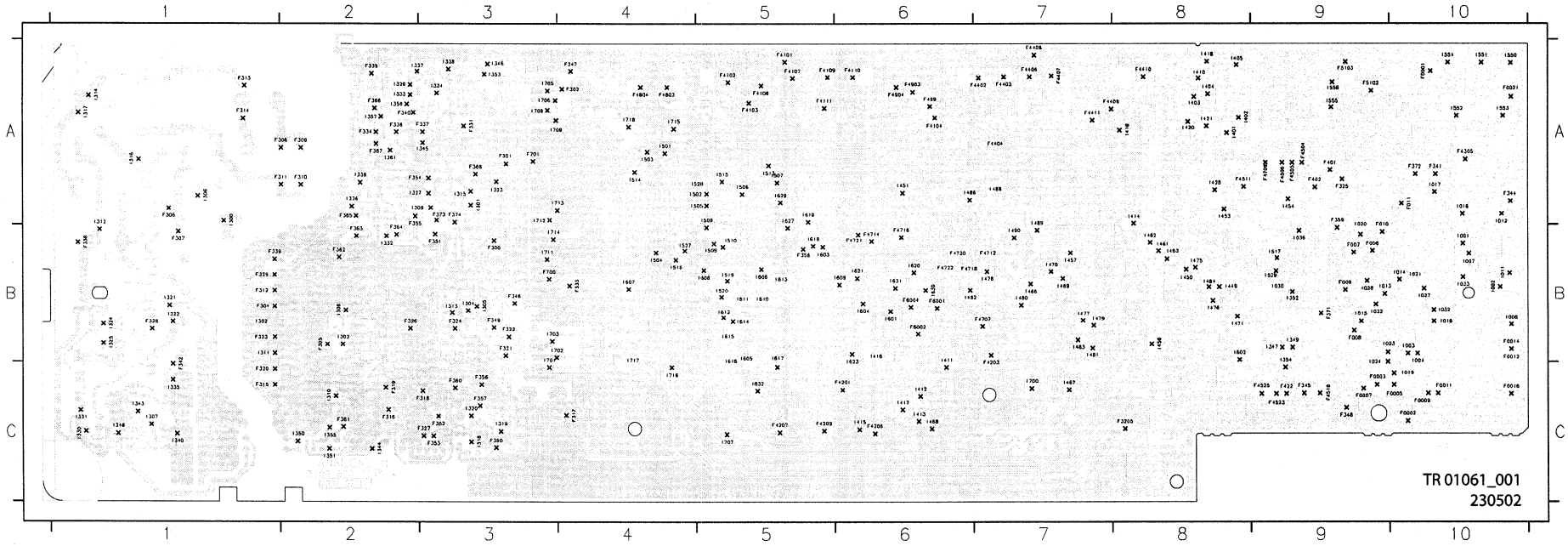


Layout Analog Board (Part 2 Bottom View)



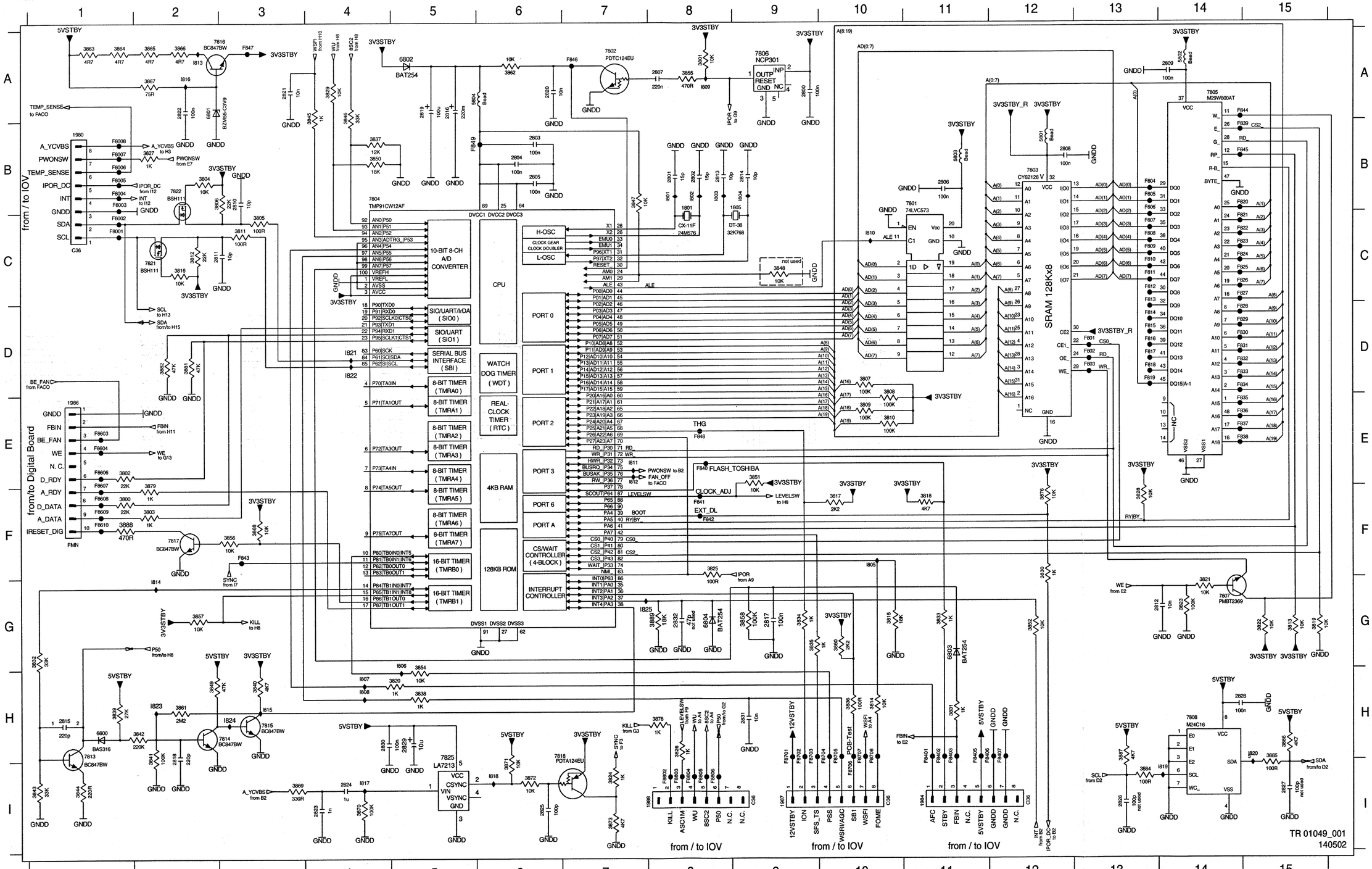
Test points overview Analog Board

F0001 A10	F010 B9	F314 A1	F328 B1	F346 B3	F361 C2	F4102 A5	F4402 A7	F4525 C9	F5102 A9	1013 B9	1032 B10	1313 B3	1330 C1	1347 B9	1404 A8	1449 B8	1471 B8	1501 A4	1519 B5	1604 B6	1619 A5	1707 C5
F0002 C10	F011 A10	F315 C1	F329 B1	F347 A4	F362 B2	F4103 A5	F4403 A7	F4707 B7	F5103 A9	1014 B10	1033 B10	1314 A1	1331 C1	1348 C1	1405 A8	1450 B8	1472 B8	1502 A5	1520 B5	1605 B5	1620 B6	1708 A3
F0003 C9	F300 B3	F316 C2	F331 A3	F348 B3	F363 B2	F4104 A6	F4404 A7	F4709 A9	F6001 B6	1015 B9	1036 B9	1315 A3	1332 B2	1349 B9	1410 A8	1451 A6	1476 B8	1503 A4	1522 B4	1606 B5	1621 B6	1709 A3
F0005 C10	F301 A3	F317 C4	F333 B4	F349 B3	F364 B2	F4106 A5	F4406 A7	F4712 B7	F6002 B6	1016 A10	1300 A1	1316 A1	1333 A2	1350 C2	1411 C6	1453 A8	1477 B7	1504 B4	1528 A5	1607 B4	1623 B6	1711 B3
F0007 C9	F302 A4	F318 C3	F334 A2	F350 C3	F365 A2	F4107 A5	F4407 A7	F4714 B6	F6004 B6	1017 A10	1301 A3	1317 A1	1334 A3	1351 C2	1412 C6	1454 A9	1478 B7	1505 A5	1529 B9	1608 B5	1627 B5	1712 A3
F0009 C10	F304 B1	F319 C2	F335 A2	F351 B3	F366 A2	F4109 A5	F4408 A7	F4716 B6	F700 B3	1018 B10	1303 B2	1318 C3	1335 C1	1352 B9	1413 C6	1456 B8	1479 B7	1506 A5	1550 A10	1609 B6	1629 A5	1713 A4
F0011 C10	F305 B2	F320 C1	F336 A2	F352 C3	F367 A2	F4110 A6	F4409 A7	F4718 B6	F701 A3	1019 C10	1304 B3	1319 C3	1336 A2	1353 A3	1414 A8	1457 B7	1480 B7	1507 A5	1551 A10	1610 B5	1630 B6	1714 B3
F0012 C10	F306 A1	F3205 C8	F337 A3	F353 C3	F368 A3	F4111 A5	F4410 A8	F4720 B6	1001 B10	1020 B9	1305 B3	1320 C3	1337 A2	1354 C9	1415 C6	1461 B8	1481 B7	1508 B5	1552 A10	1611 B5	1631 B6	1715 A4
F0014 B10	F307 B1	F321 B3	F338 B1	F354 A3	F371 B9	F4201 C6	F4411 A7	F4721 B6	1002 B10	1021 B10	1306 A1	1321 B1	1338 A3	1355 C2	1416 B6	1462 B8	1482 B6	1509 B5	1553 A10	1612 B5	1632 C5	1716 C4
F0016 C10	F308 A2	F322 B3	F339 B1	F355 A4	F372 A10	F4203 B7	F4504 A9	F4722 B6	1003 B10	1022 B9	1307 C1	1322 B1	1339 A2	1356 A2	1417 C6	1463 B8	1483 B7	1510 B5	1554 A10	1613 B5	1700 C7	1717 C4
F0021 A10	F309 A2	F323 B1	F340 A2	F356 C3	F373 A3	F4206 C6	F4505 A9	F4803 A4	1004 B10	1023 B9	1308 B2	1323 A3	1340 C1	1357 A2	1418 A8	1466 B7	1484 B8	1513 A5	1555 A9	1614 B5	1701 C3	1718 A4
F006 B9	F310 A2	F324 B3	F341 A10	F357 C3	F374 A3	F4207 C5	F4506 A9	F4804 A4	1006 B10	1024 B9	1309 A3	1324 B1	1343 C1	1361 A2	1419 A8	1467 C7	1486 A6	1514 A4	1556 A9	1615 B5	1702 B3	
F007 B9	F311 A2	F325 A9	F342 C1	F358 B5	F401 A9	F4209 C5	F4511 A8	F4903 A6	1007 B10	1027 B10	1310 C2	1325 B1	1344 C2	1401 A8	1420 A8	1468 C6	1488 A7	1515 A5	1601 B8	1616 B5	1703 B3	
F008 B9	F312 B1	F326 B2	F344 A10	F359 B9	F402 A9	F422 C9	F4518 C9	F4904 A6	1011 B10	1028 B9	1311 B1	1327 A3	1345 A3	1402 A8	1421 A8	1469 B7	1489 B7	1516 B4	1602 B8	1617 C5	1705 A3	
F009 B9	F313 A1	F327 C3	F345 C9	F360 C3	F4101 A5	F4305 A10	F4523 C9	F499 A6	1012 A10	1030 B9	1312 B1	1329 A2	1346 A3	1403 A8	1428 A8	1470 B7	1490 B7	1517 B9	1603 B5	1618 B5	1706 A3	



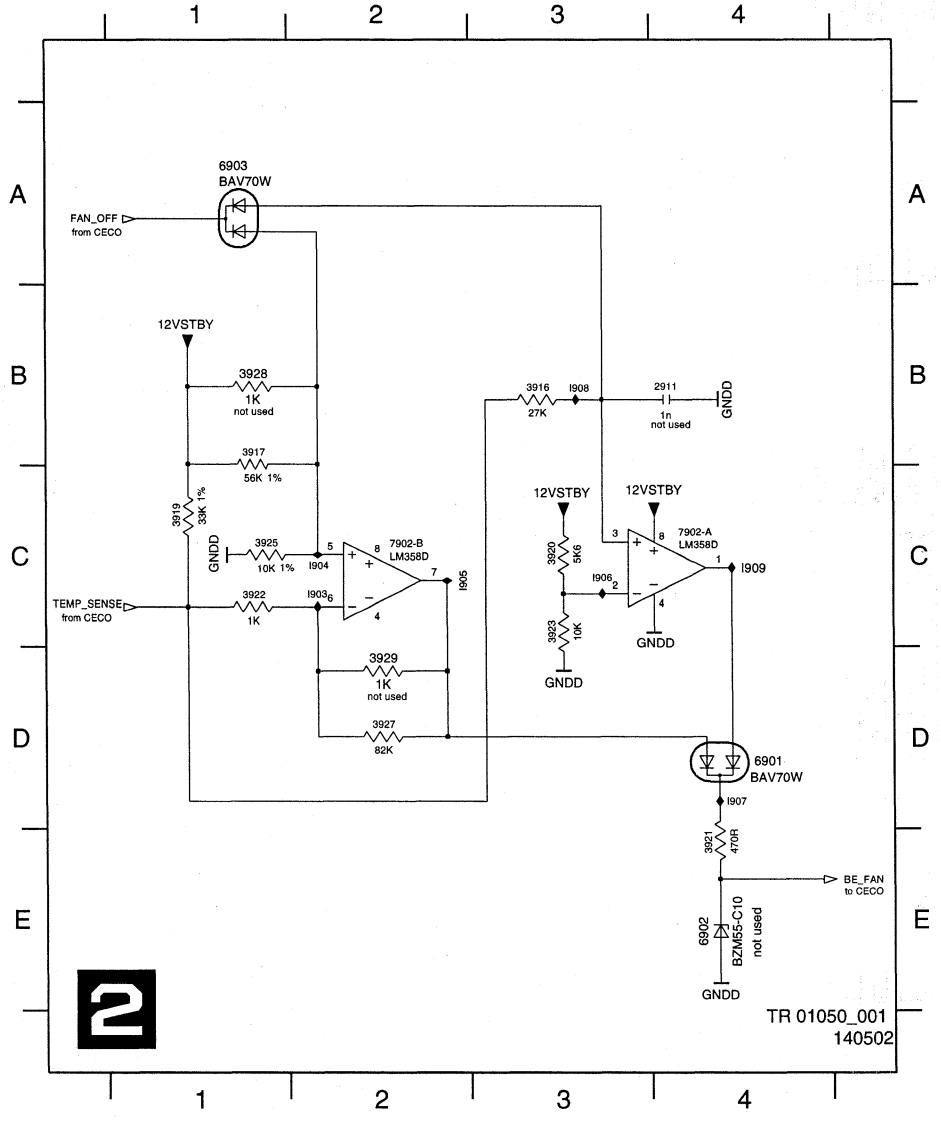
UPC12 Sub PCB: Central Controller (CECO)

1801 B8 1805 B9 1980 B1 1984 I11 1986 E1 1987 I9 1988 I8 2800 A9
2801 B8 2802 B8 2803 B6 2804 B6 2805 B6 2806 B11 2807 A8 2808 B12
2809 A14 2810 B3 2811 C2 2812 G13 2813 B8 2814 B9 2815 H1 2816 A5
2817 G9 2818 H2 2819 A5 2820 A6 2821 A3 2822 A2 2823 I4 2824 I4
2825 I6 2826 I13 2827 I15 2828 H15 2829 H5 2830 H4 2831 H9 2832 G8
3800 F1 3801 A8 3802 E1 3803 F2 3804 B2 3805 C3 3806 B2 3807 D10
3808 D10 3809 E10 3810 E10 3811 C3 3812 C2 3813 G15 3814 H10 3815 G10
3816 C2 3817 F10 3818 F11 3819 G15 3820 H5 3821 F14 3822 G15 3823 G14
3824 I7 3825 F8 3826 H8 3827 B2 3828 F13 3829 A4 3831 H11
3832 G1 3833 G11 3834 H3 3835 H2 3836 H10 3837 B4 3838 H5 3839 H1
3840 H3 3841 H2 3842 H2 3843 I1 3844 I1 3845 A4 3846 A4 3847 B7
3846 C9 3849 H2 3850 B4 3851 E9 3852 G12 3854 G5 3855 A8 3856 F3
3857 G2 3858 G9 3860 G10 3861 H2 3862 A6 3863 A1 3864 A1 3865 A2
3866 A2 3867 A2 3868 F3 3869 I3 3870 I4 3871 I6 3872 I6 3873 I7
3876 F12 3878 H8 3879 E2 3880 D2 3881 D2 3882 D2 3884 H14 3885 H15 3886 H15
3887 H13 3888 F1 3889 G8 5801 B12 5802 A14 5803 B11 5804 A5 6800 H1
6801 A2 6802 A5 6803 G11 6804 G8 7801 B11 7802 A7 7803 B12 7804 B4
7805 A14 7806 A9 7807 G14 7808 H14 7813 H1 7814 H2 7816 A3
7817 F2 7818 H6 7821 C2 7822 B2 7825 H5 8001 C1 8002 C1 8003 B1
F8004 B1 F8005 B1 F8006 B1 F8007 B1 F8008 B1 F8001 D13 F8002 D13 F8003 D13
I804 B13 I805 B13 I806 B13 I807 C13 I808 C13 I810 C13 I811 C13
F812 C13 F813 C13 F814 D13 F815 D13 F816 D13 F817 D13 F818 D13 F819 D13
F820 B15 F821 C15 F822 C15 F823 C15 F824 C15 F825 C15 F826 C15 F827 C15
F828 D15 F829 D15 F830 D15 F831 D15 F832 D15 F833 D15 F834 D15 F835 E15
F836 E15 F837 E15 F838 E15 F839 B15 F840 E8 F8401 H11 F8402 H11 F8403 H11
F8405 H11 F8406 H11 F8407 H12 F841 F8 F842 F8 F843 F3 F844 A15 F845 B15
F846 A7 F847 A3 F848 E8 F849 B5 F8601 E1 F8602 H9 F8603 E1 F8604 E1 F8605 E1 F8606 E1 F8607 E1
F8608 F1 F8609 F1 F8610 F1 F8701 H9 F8702 H9 F8703 H9 F8704 H10 F8705 H10 F8706 I8
F8706 I10 F8707 H10 F8708 H10 F8802 I8 F8803 I8 F8804 I8 F8805 I8 F8806 I8 F8807 I8
I801 B8 I802 B8 I803 B8 I804 B9 I805 F10 I806 G5 I807 H4 I808 H4
I809 A8 I810 C10 I811 E7 I812 E7 I813 A2 I814 G2 I815 H3 I816 A2
I817 I4 I818 I6 I819 H14 I820 H15 I821 D4 I822 D4 I823 H2 I824 H3
I825 G7



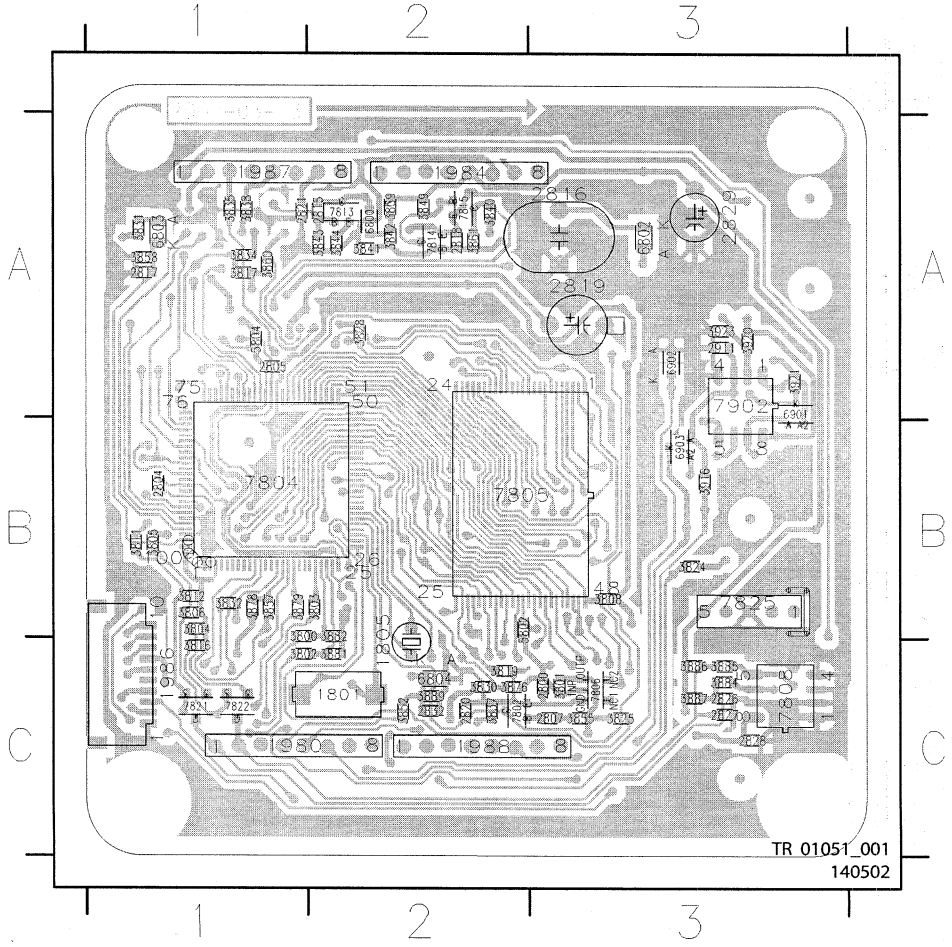
UPC12 Sub PCB: Fan Control (FACO)

2911 B4	3919 C1	3922 C1	3927 D2	6901 D4	7902-A C4	I904 C2	I907 D4
3916 B3	3920 C3	3923 C3	3928 B1	6902 E4	7902-B C2	I905 C2	I908 B3
3917 B1	3921 E4	3925 C1	3929 D2	6903 A1	I903 C2	I906 C3	I909 C4



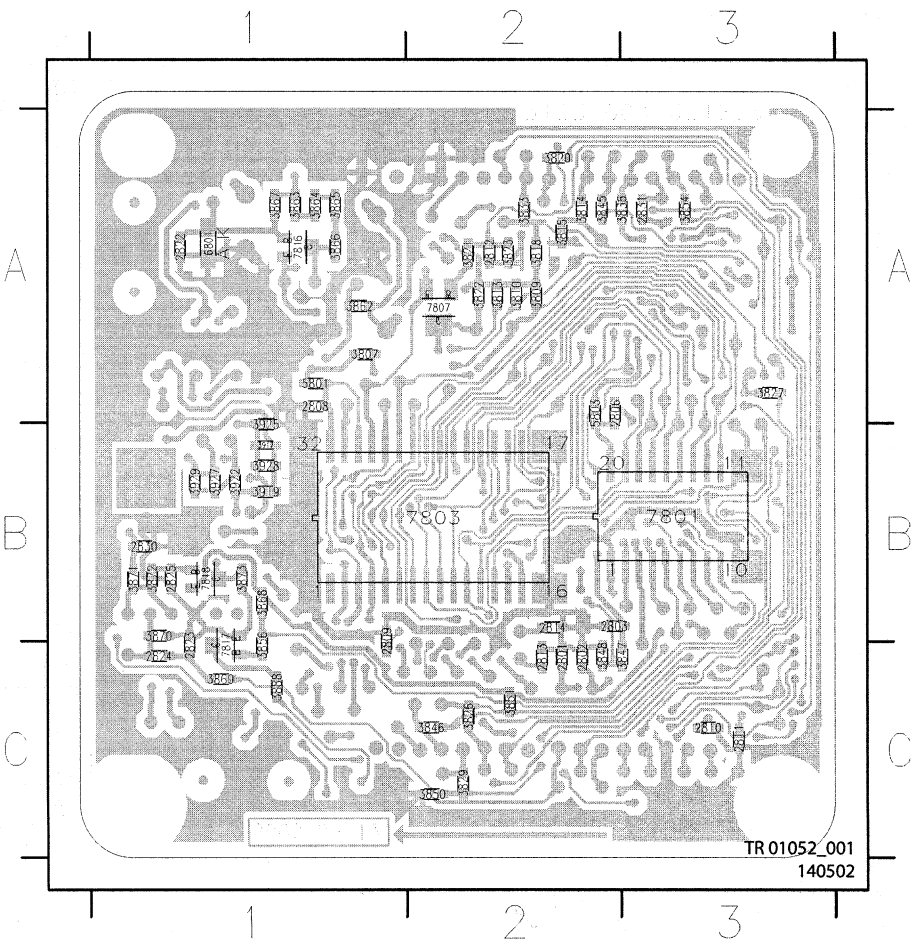
Layout UPC 12 Sub PCB (Top View)

1801	C2	2820	C2	3811	B1	3840	A2	3882	B2	6901	A3
1805	C2	2821	A1	3812	B1	3841	A2	3883	C3	6902	A3
1980	C1	2826	C3	3815	C1	3842	A2	3884	C3	6903	B3
1984	A2	2827	C3	3817	A1	3843	A2	3886	C3	7802	C2
1986	C1	2828	C3	3819	C2	3844	A2	3887	C3	7804	B1
1987	A1	2829	A3	3824	B3	3849	A2	3889	C2	7805	B2
1988	C2	2832	C2	3825	C3	3852	C2	3891	B3	7806	C3
2800	C3	2911	A3	3828	A2	3855	C3	3916	B3	7808	C3
2804	B1	3800	B1	3830	C2	3857	B1	3920	A3	7813	A2
2805	A1	3801	C3	3831	A1	3858	A1	3923	A3	7814	A2
2807	C3	3802	C1	3832	B1	3860	A1	5802	B2	7815	A2
2815	A2	3803	B2	3834	A1	3861	A2	5804	A1	7821	C1
2816	A3	3804	B1	3835	A1	3876	C2	6800	A2	7822	C1
2817	A1	3805	B1	3837	C2	3878	B1	6802	A3	7825	B3
2818	A2	3806	B1	3838	A1	3879	B1	6803	A1	7902	A3
2819	A3	3808	B3	3839	A2	3881	C2	6804	C2		

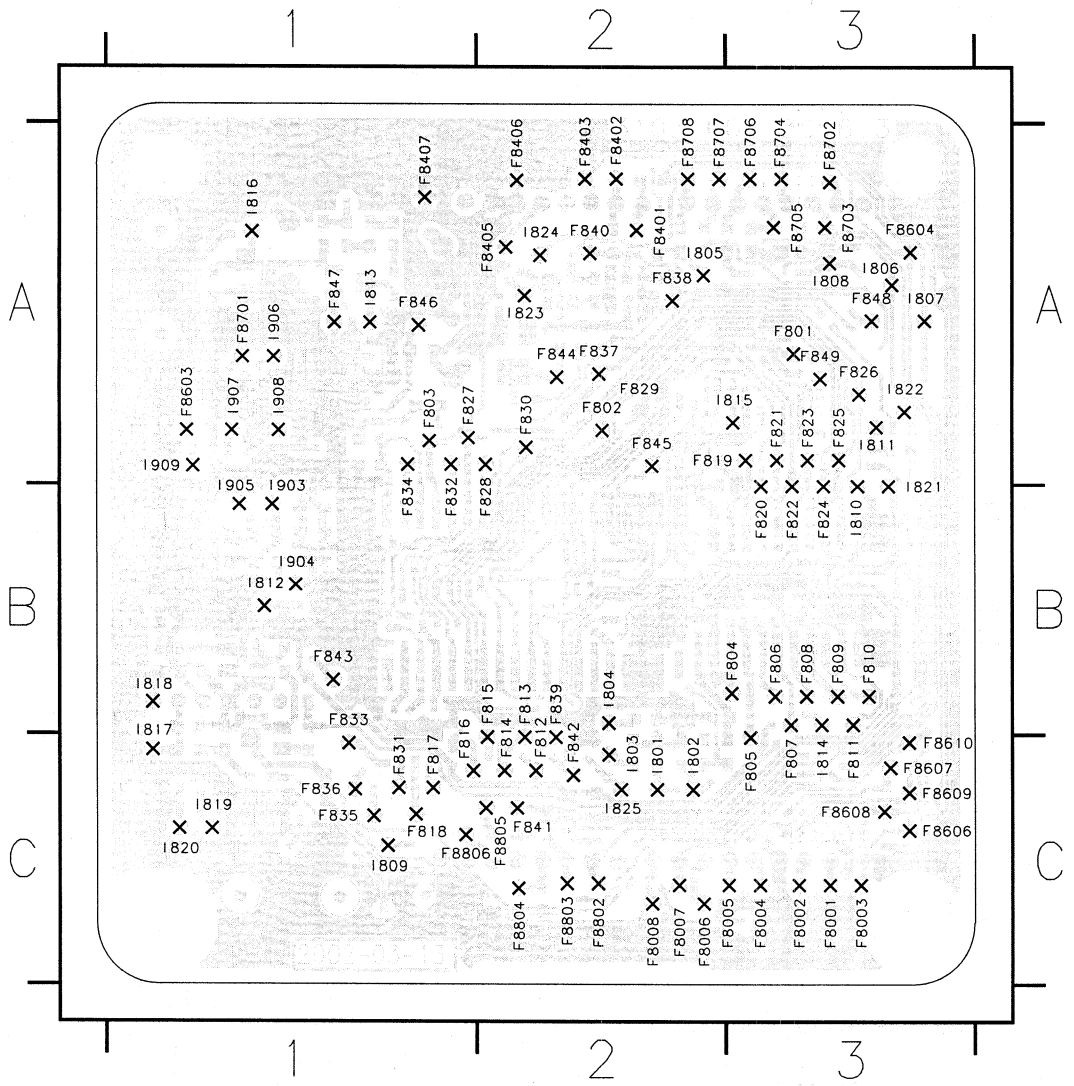


Layout UPC 12 Sub PCB (Bottom View)

2801	C2	2823	C1	3820	A2	3848	C2	3869	C1	3929	B1
2802	C2	2824	C1	3821	A2	3850	C2	3870	B1	5801	A1
2803	B2	2825	B1	3822	A2	3851	C2	3871	B1	5803	A2
2806	A2	2830	B1	3823	A2	3854	A3	3872	B1	6801	A1
2808	A1	2831	A3	3826	C2	3856	C1	3873	B1	7801	B3
2809	B1	3807	A1	3827	A3	3862	A1	3888	C1	7803	B2
2810	C3	3809	A2	3829	C2	3863	A1	3917	B1	7807	A2
2811	C3	3810	A2	3833	A2	3864	A1	3919	B1	7816	A1
2812	A2	3813	A2	3836	A3	3865	A1	3922	B1	7817	C1
2813	C2	3814	A2	3845	A2	3866	A1	3925	B1	7818	B1
2814	B2	3815	A2	3846	C2	3867	A1	3927	B1		
2822	A1	3818	A2	3847	C3	3868	B1	3928	B1		



Tests points overview UPC12 Sub PCB

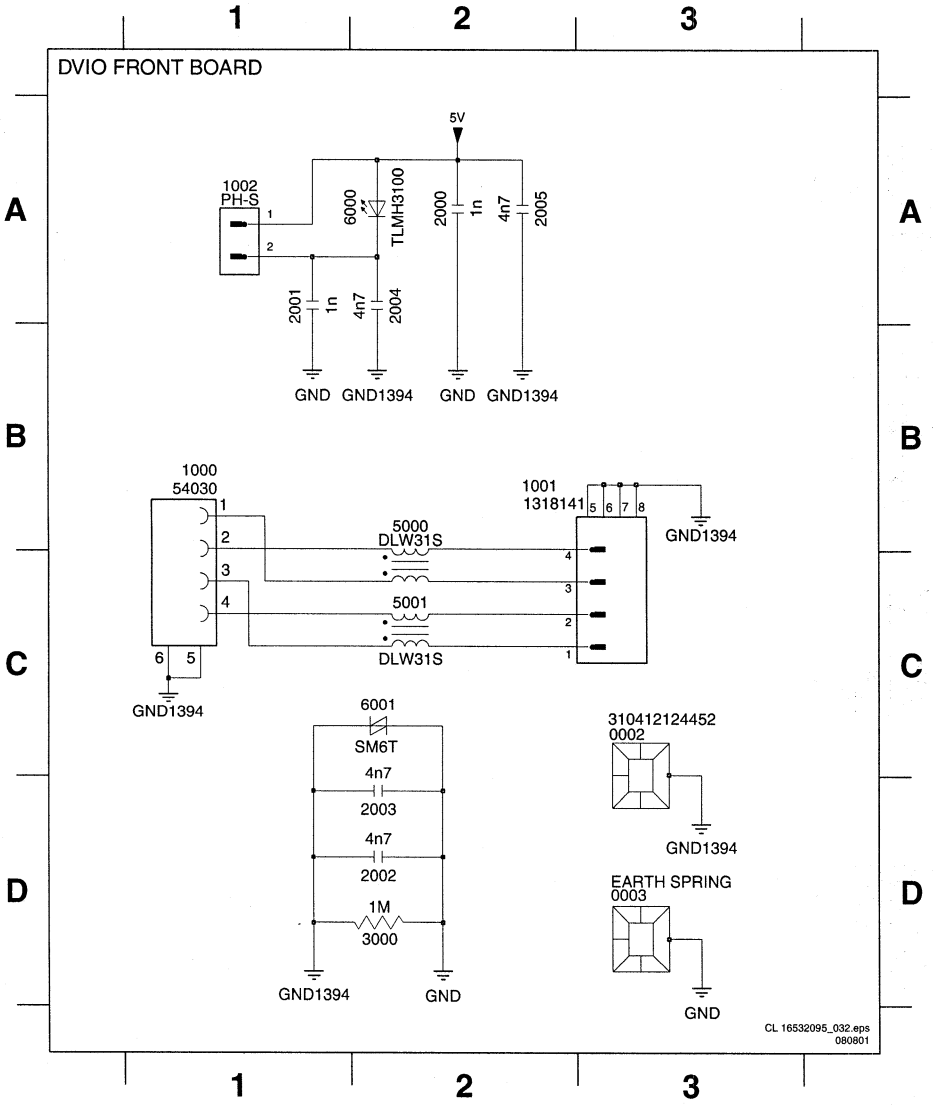


F8001	C3	F8403	A2	8817	C1
F8002	C3	F8405	A2	8818	B1
F8003	C3	F8406	A2	8819	C1
F8004	C3	F8407	A1	8820	C1
F8005	C3	F841	C2	8821	B3
F8006	C2	F842	C2	8822	A3
F8008	C2	F843	B1	8823	A2
F8009	C2	F844	A2	8824	A2
F801	A3	F845	A2	8825	C2
F802	A2	F846	A1	9903	B1
F803	A1	F847	A1	9904	B1
F804	B3	F848	A3	9905	B1
F805	C3	F849	A3	9906	A1
F806	B3	F8603	A1	9907	A1
F807	B3	F8604	A3	9908	A1
F808	B3	F8606	C3	909	A1
F809	B3	F8607	C3		
F8110	B3	F8608	C3		
F8111	B3	F8609	C3		
F8112	C2	F8610	C3		
F8113	C2	F8701	A1		
F8114	C2	F8702	A3		
F8115	C2	F8703	A3		
F8116	C1	F8704	A3		
F8117	C1	F8705	A3		
F8118	C1	F8706	A3		
F8119	A3	F8707	A2		
F8120	B3	F8708	A2		
F8121	A3	F8802	C2		
F8122	B3	F8803	C2		
F8123	A3	F8804	C2		
F8124	B3	F8805	C2		
F8125	A3	F8806	C1		
F8126	A3	8801	C2		
F8127	A1	8802	C2		
F8128	A2	8803	C2		
F8130	A2	8804	B2		
F8131	C1	8805	A2		
F8132	A1	8806	A3		
F8133	C1	8807	A3		
F8134	A1	8808	A3		
F8135	C1	8809	C1		
F8136	C1	8810	B3		
F8137	A2	8811	A3		
F8138	A2	8812	B1		
F8139	C2	8813	A1		
F8140	A2	8814	B3		
F8401	A2	8815	A3		
F8402	A2	8816	A1		

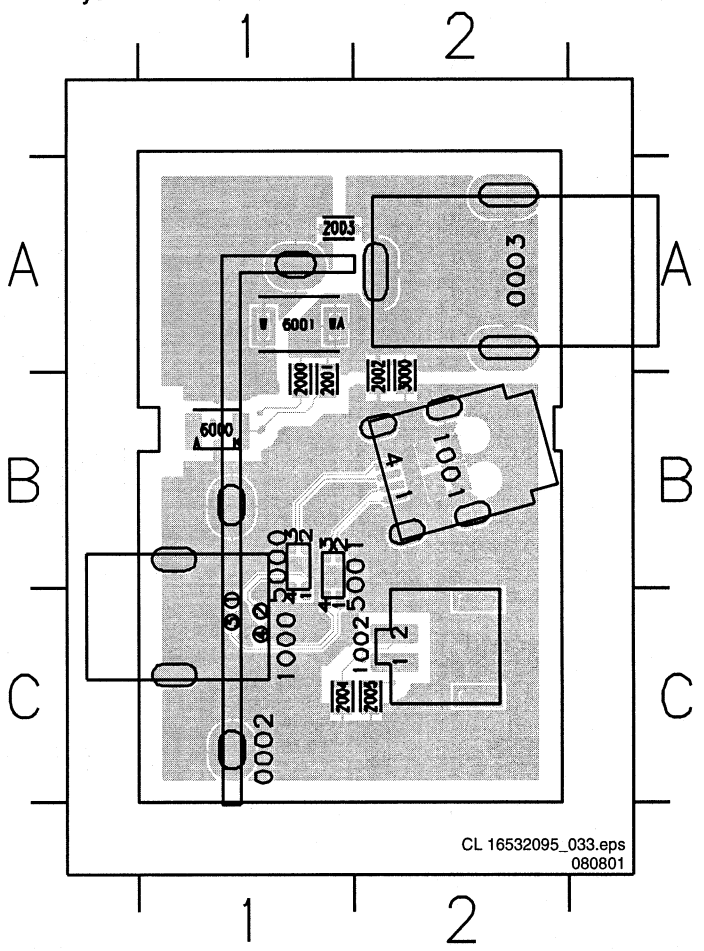
TR 01053_001
140502

DVIO Front Board

0002 C3	1000 B1	1002 A1	2001 A1	2003 D2	5000 B2	6000 A2
0003 D3	1001 B2	2000 A2	2002 D2	3000 D2	5001 C2	6001 C2



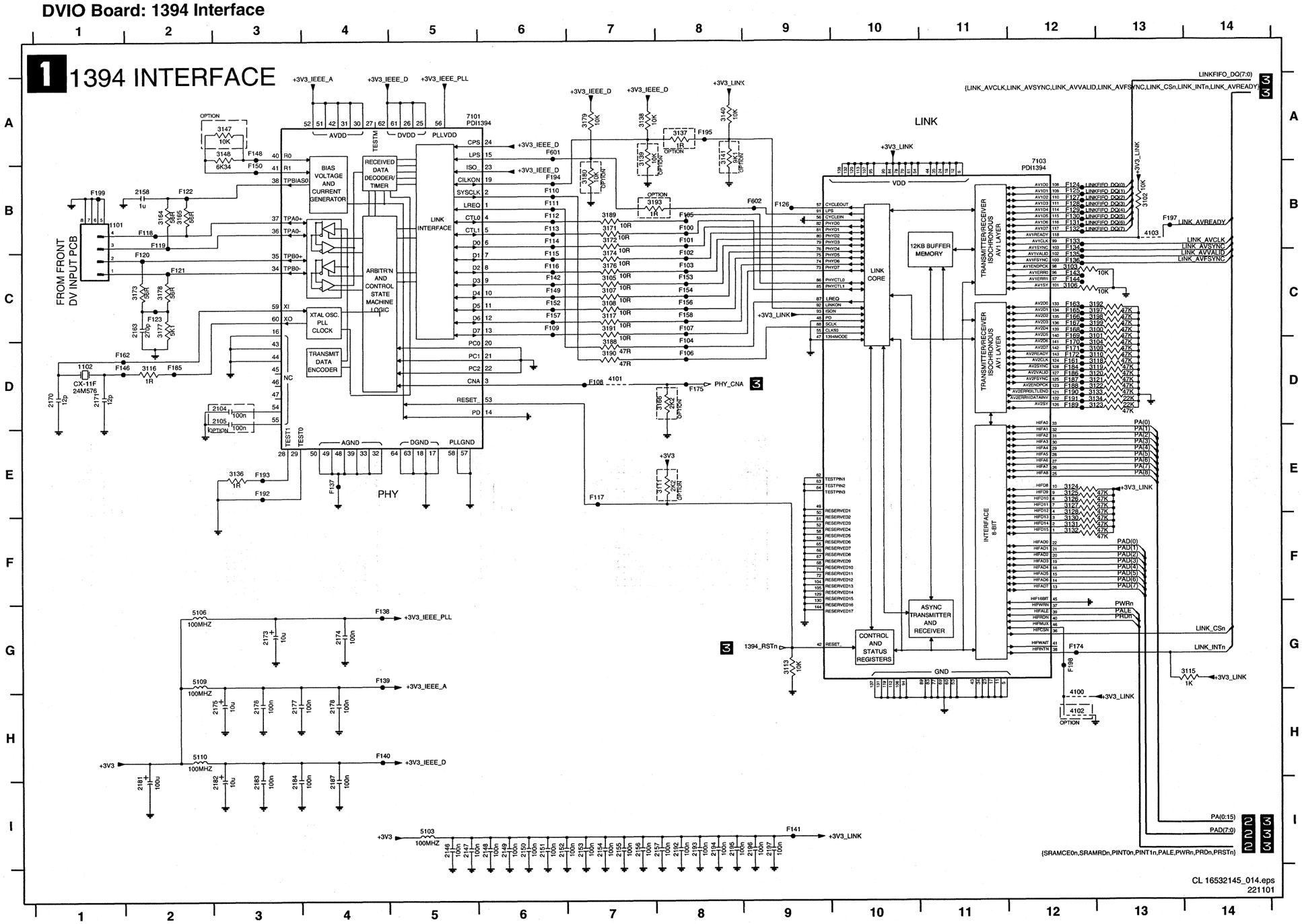
Layout DVIO Front Board



0002 C1
0003 A2
1000 C1
1001 B2
1002 C2
2000 B1
2001 B1
2002 B2
2003 A1
2004 C1
2005 C2
3000 B2
5000 B2
5001 B2
6000 B1
6001 A1

DVIO Board: 1394 Interface

1 1394 INTERFACE

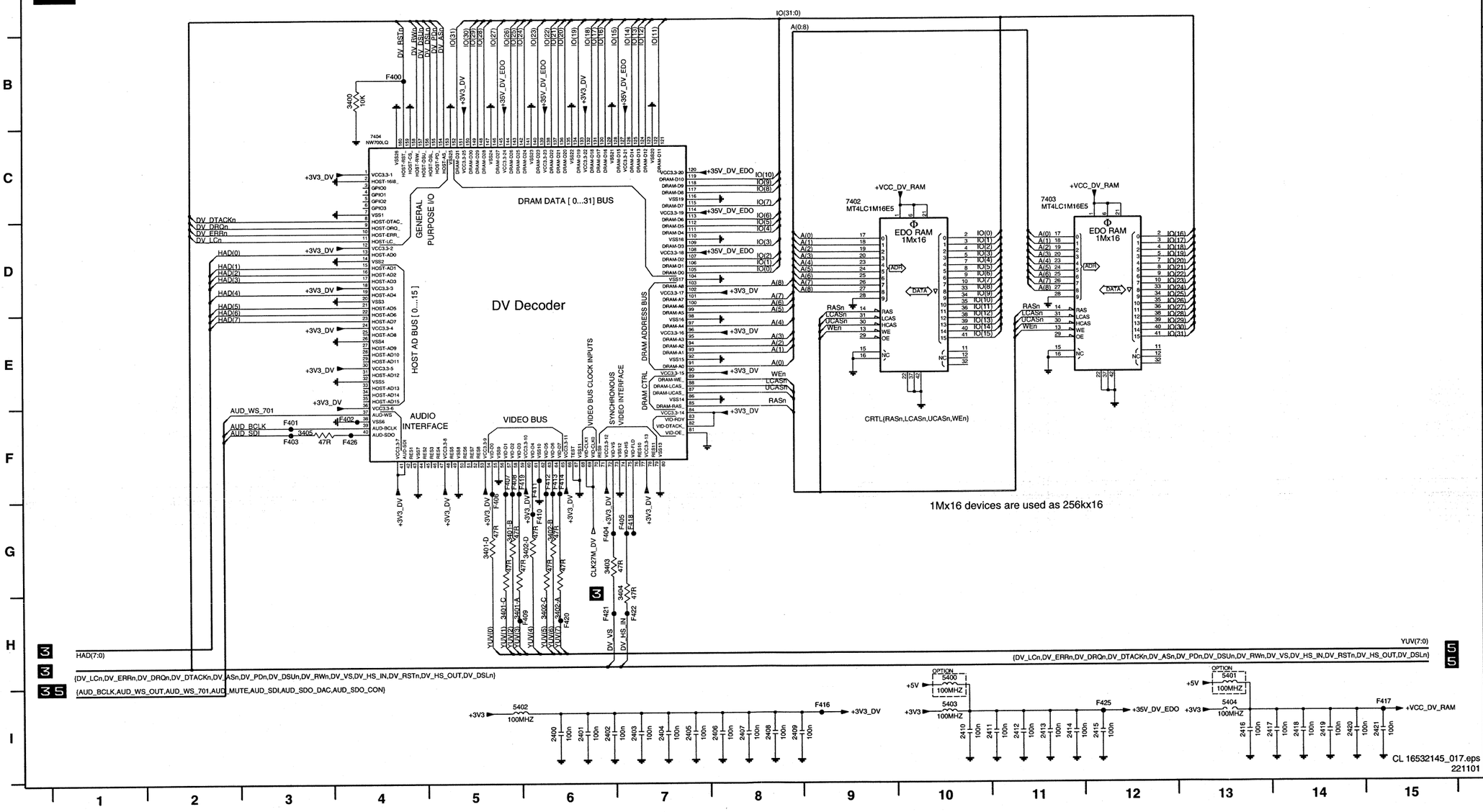


CL 16532145_014.eps
221101

1101	B1	3180	B7	F184	D12
1102	D1	3188	D7	F185	D2
2104	D3	3189	B7	F186	D12
2105	D3	3190	D7	F187	D12
2146	I5	3191	C7	F188	D12
2147	I5	3192	C13	F189	D12
2148	I6	3193	B7	F190	D12
2149	I6	3197	C13	F191	D12
2150	I6	3198	C13	F192	E3
2151	I6	3199	C13	F193	E3
2152	I6	4100	H12	F194	B6
2153	I7	4101	D7	F195	A8
2154	I7	4102	H12	F197	B13
2155	I7	4103	B13	F198	G12
2156	I7	5103	I5	F199	B1
2157	I8	5106	G2	F601	A6
2158	B2	5109	G2	F602	B9
2163	C2	5110	H2		
2170	D1	7101	A5		
2171	D1	7103	B12		
2173	G3	F100	B8		
2174	G4	F101	B8		
2175	H3	F102	C8		
2176	H3	F103	C8		
2177	H3	F104	D8		
2178	H4	F105	B8		
2181	I2	F106	D8		
2182	I3	F107	C8		
2183	I3	F108	D7		
2184	I3	F109	C6		
2187	I4	F110	B6		
2192	I8	F111	B6		
2193	I8	F112	B6		
2194	I8	F113	B6		
2195	I8	F114	B6		
2196	I9	F115	C6		
2197	I9	F116	C6		
3100	C13	F117	E7		
3101	D13	F118	B2		
3102	B13	F119	B2		
3103	C12	F120	C2		
3104	D13	F121	C2		
3105	C7	F122	B2		
3106	C12	F123	C2		
3107	C7	F124	B12		
3108	C7	F125	B12		
3109	D13	F126	B9		
3110	D13	F127	B12		
3111	E8	F128	B12		
3113	G9	F129	B12		
3115	G14	F130	B12		
3116	D2	F131	B12		
3117	C7	F132	B12		
3118	D13	F133	B12		
3119	D13	F134	C12		
3120	D13	F135	C12		
3121	D13	F136	C12		
3122	D13	F137	E4		
3123	D13	F138	G4		
3124	E12	F139	G4		
3125	E12	F140	H4		
3126	E12	F141	I9		
3127	E12	F142	C6		
3128	F12	F143	C12		
3130	F12	F144	C12		
3131	F12	F146	D1		
3132	F12	F148	A3		
3133	D13	F149	C6		
3134	D13	F150	B3		
3136	E3	F152	C6		
3137	A8	F153	C8		
3138	A7	F154	C8		
3139	A7	F156	C8		
3140	A8	F157	C6		
3141	A8	F158	C8		
3147	A3	F161	D12		
3148	A3	F162	D1		
3164	B2	F163	C12		
3165	B2	F165	C12		
3166	D8	F166	C12		
3171	B7	F167	C12		
3172	B7	F168	C12		
3173	C2	F169	D12		
3174	C7	F170	D12		
3176	C7	F171	D12		
3177	C2	F172	D12		
3178	C2	F174	G12		
3179	A7	F175	D8		

DVIO Board: DVCODEC

4 DVCODEC



2400	I6
2401	I6
2402	I6
2403	I7
2404	I7
2405	I7
2406	I8
2407	I8
2408	I8
2409	I8
2410	I10
2411	I10
2412	I11
2413	I11
2414	I11
2415	I12
2416	I13
2417	I13
2418	I14
2419	I14
2420	I14
2421	I15
3400	B4
3401-A	H5
3401-B	G5
3401-C	H5
3401-D	G5
3402-A	H6
3402-B	G6
3402-C	H6
3402-D	G6
3403	G6
3404	G7
3405	F3
5400	H10
5401	H13
5402	I5
5403	I10
5404	I13
7402	C9
7403	C11
7404	C4
F400	B4
F401	F3
F402	F4
F403	F3
F404	G6
F405	G7
F406	F5
F407	F5
F408	F5
F409	H6
F410	G6
F411	F6
F412	F6
F413	F6
F414	F6
F416	I9
F417	I15
F418	G7
F419	F6
F420	H6
F421	H6
F422	H7
F425	I12
F426	F4

DVIO Board: Audio & Video Output

5 AUDIO & VIDEO OUTPUT

Clock delay

+3V3_dly
7500-A 74LVC04A
7500-B 74LVC04A
7500-C 74LVC04A
7500-E 74LVC04A
7500-D 74LVC04A
CLK27M_CON
4500 OPTION
F500
F501
F502
5500 100MHZ
2500 100n
5501 100MHZ
2501 2502 2503 2504 100n
7505 74LVC16244AD
BUFENn_VID
BUFENn_AUD
YUV(0) YUV(1) YUV(2) YUV(3) YUV(4) YUV(5) YUV(6) YUV(7)
F527
DV_HS_OUT
DV_VS
AUD_BCLK
AUD_SDO_CON
AUD_WS_OUT
Buffer
1500 179161
RTSN
RESETn
ISPN
TXD
TDI
TCK
TDO
TMS
CTSN
RXD
To digital PCB

{SRAMCE0n,SRAMRDn,PINT0n,PINT1n,PALE,PWRn,PRDn,PRSTn}
{LINK_AVCLK,LINK_AVSYNC,LINK_AVVALID,LINK_AVFSYNC,LINK_CSn,LINK_INTn,LINK_AVREADY}
PINT0n
PINT1n
LINK_AVVALID
LINK_AVFSYNC
DOUT
IO1
IO3
IO4
IO10
1508 PH-S
OPTION

DAC
7506 UDA1334ATS
AUD_BCLK
AUD_WS_OUT
AUD_SDO_DAC
AUD_MUTE
DIGITAL INTERFACE
PLL
DE-EMPHASIS
INTERPOLATION FILTER
NOISE SHAPER
SYSCLKIPLL1
SFOR0
SFOR1
To analog PCB

YUV(7:0)
{DV_LCn,DV_ERRn,DV_DRQn,DV_DTACKn,DV_ASn,DV_PDn,DV_DSUn,DV_RWn,DV_VS,DV_HS_IN,DV_RSTn,DV_HS_OUT,DV_DSLn}
{TDI,TCK,TDO,TDO_CONF,TMS}
{AUD_BCLK,AUD_WS_OUT,AUDIO_WS_701,AUD_MUTE,AUD_SDI,AUD_SDO_DAC,AUD_SDO_CON}

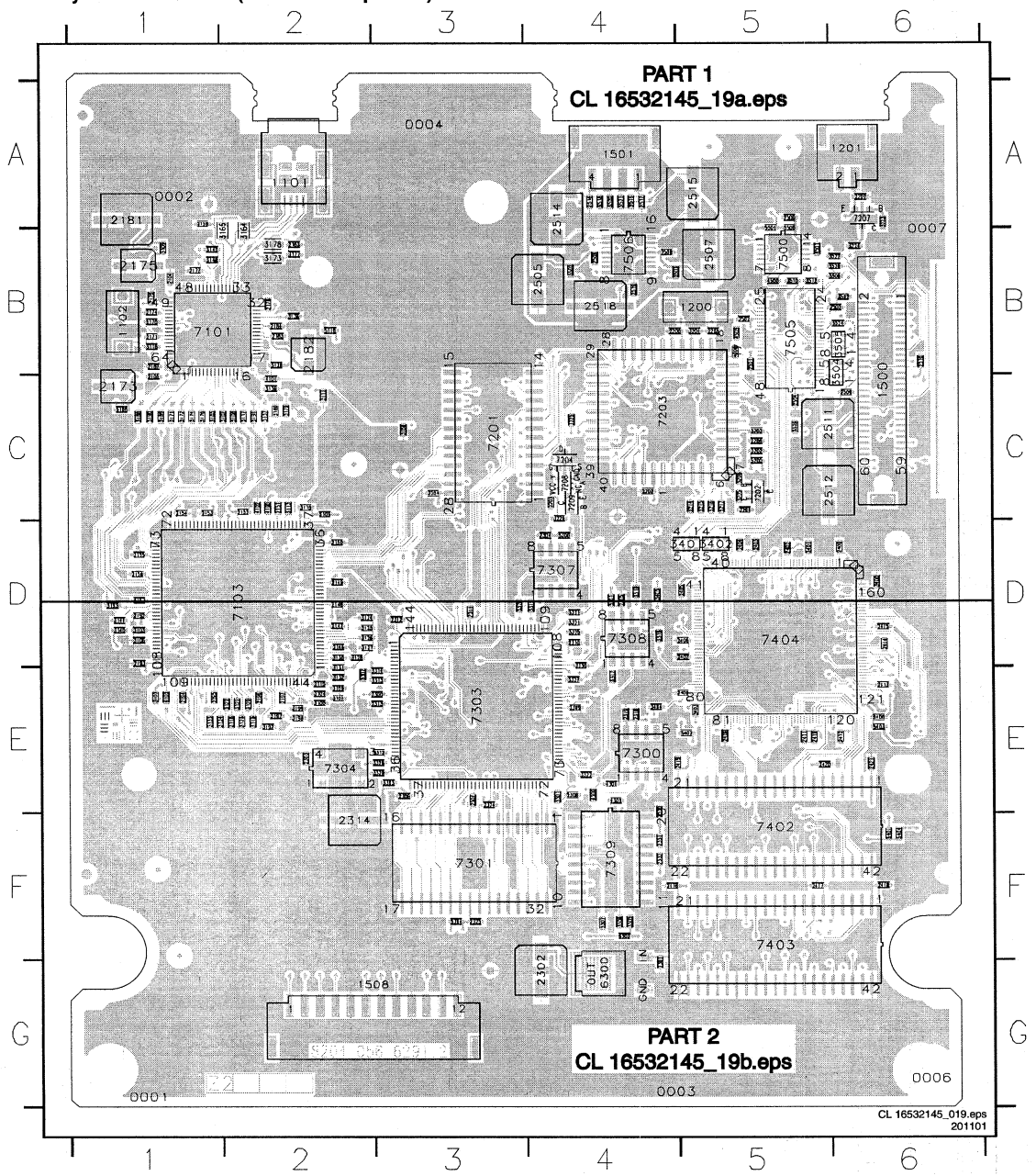
7500-F 74LVC04A
OPTION

Shielding connection on mounting holes
Hole 4.0 mm with Cu
Hole 4.0 mm with Cu
Hole 4.9mm
Hole 3.6 mm

CL 16532145_018.eps
221101

0001	I4	F509	C6
0002	I5	F510	C5
0003	I6	F511	D6
0004	I6	F512	D6
0005	I7	F513	D7
0006	I8	F514	D6
0007	I8	F515	D6
1500	C7	F516	D6
1501	G14	F517	D6
1502	I2	F518	D7
1503	I2	F519	D5
1504	I2	F520	D5
1505	I2	F521	E7
1506	I3	F522	D5
1507	I3	F523	E6
1508	A14	F524	D5
2500	C1	F525	E12
2501	C3	F526	E12
2502	C3	F527	E2
2503	C3	F528	E6
2504	C3	F529	D5
2505	E12	F530	E4
2506	E12	F531	E7
2507	E11	F532	E8
2508	E11	F533	E4
2509	E6	F534	F7
2510	F8	F535	F7
2511	F8	F536	F7
2512	G8	F537	G7
2514	G11	F538	G7
2515	G13	F539	G8
2516	G10	F540	G10
2517	G13	F541	G13
2518	H12	F542	G13
2519	H12	F543	G14
3502	D5	F544	G12
3504-A	D5	F545	G11
3504-B	C5	F546	G7
3504-C	D5	F547	G8
3504-D	C5	F548	G12
3505-A	D5	F549	H7
3505-B	C5	F550	H8
3505-C	D5	F551	H7
3505-D	C5	F552	H8
3506	E5	F553	H13
3510	B3	F554	E4
3511	B4	F555	F4
3512	B5	F556	F4
3518	G10	F557	F6
3519	G13	F558	F6
3520	G10	F559	E6
3521	G13		
3524	D5		
3525	E5		
3526	F5		
3527	F5		
4500	B4		
4505	E6		
4506	A13		
4507	A13		
4508	A13		
4509	A13		
4510	B13		
4511	B13		
4512	B13		
4513	B13		
4514	B13		
5500	B1		
5501	C3		
5502	E12		
5503	E12		
7500-A	B2		
7500-B	B2		
7500-C	B3		
7500-D	B4		
7500-E	B4		
7500-F	I1		
7505	D3		
7506	F11		
F500	B4		
F501	B5		
F502	B3		
F503	C6		
F504	C5		
F505	C6		
F506	C5		
F507	C6		
F508	C5		

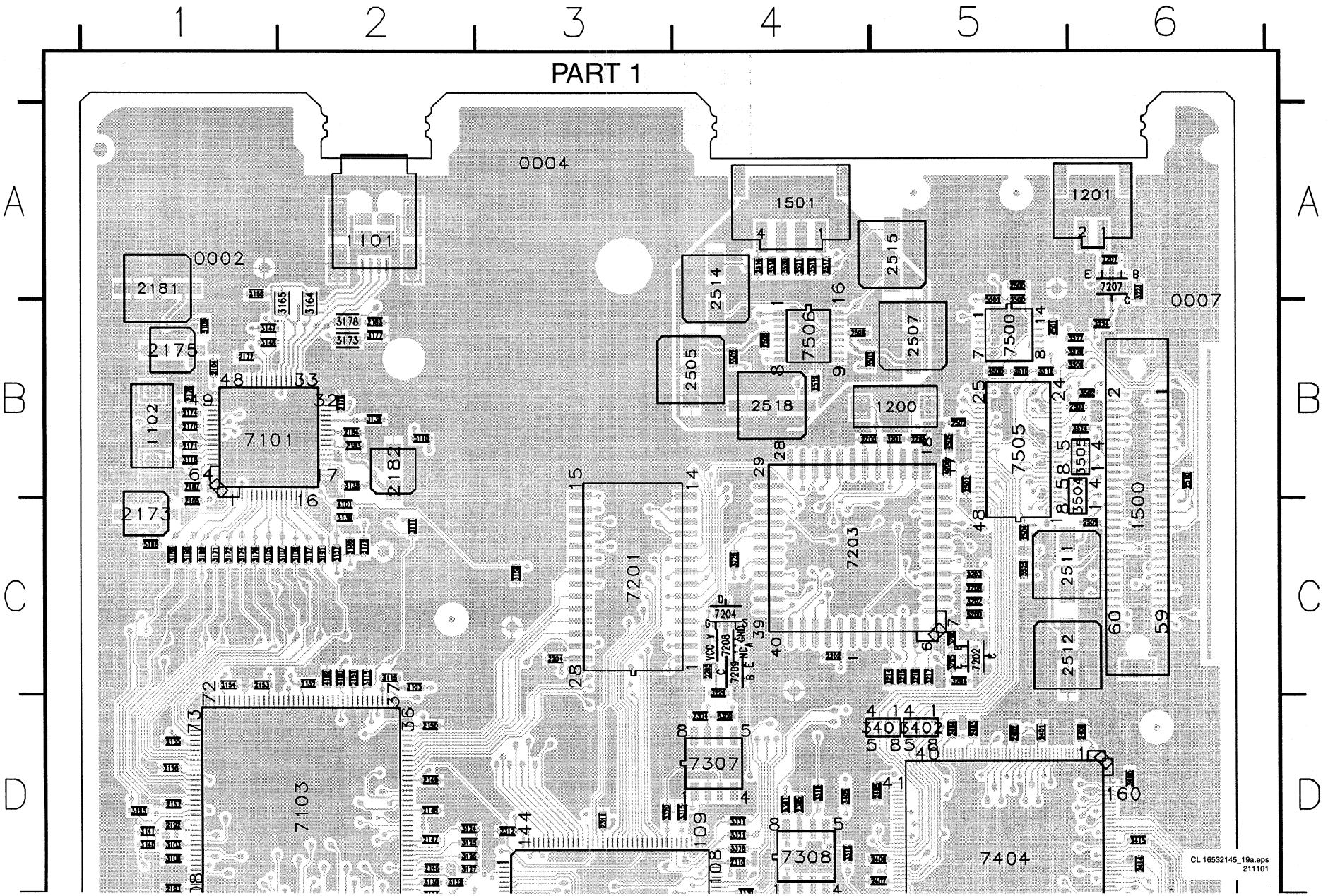
Layout DVIO Board (Overview Top View)



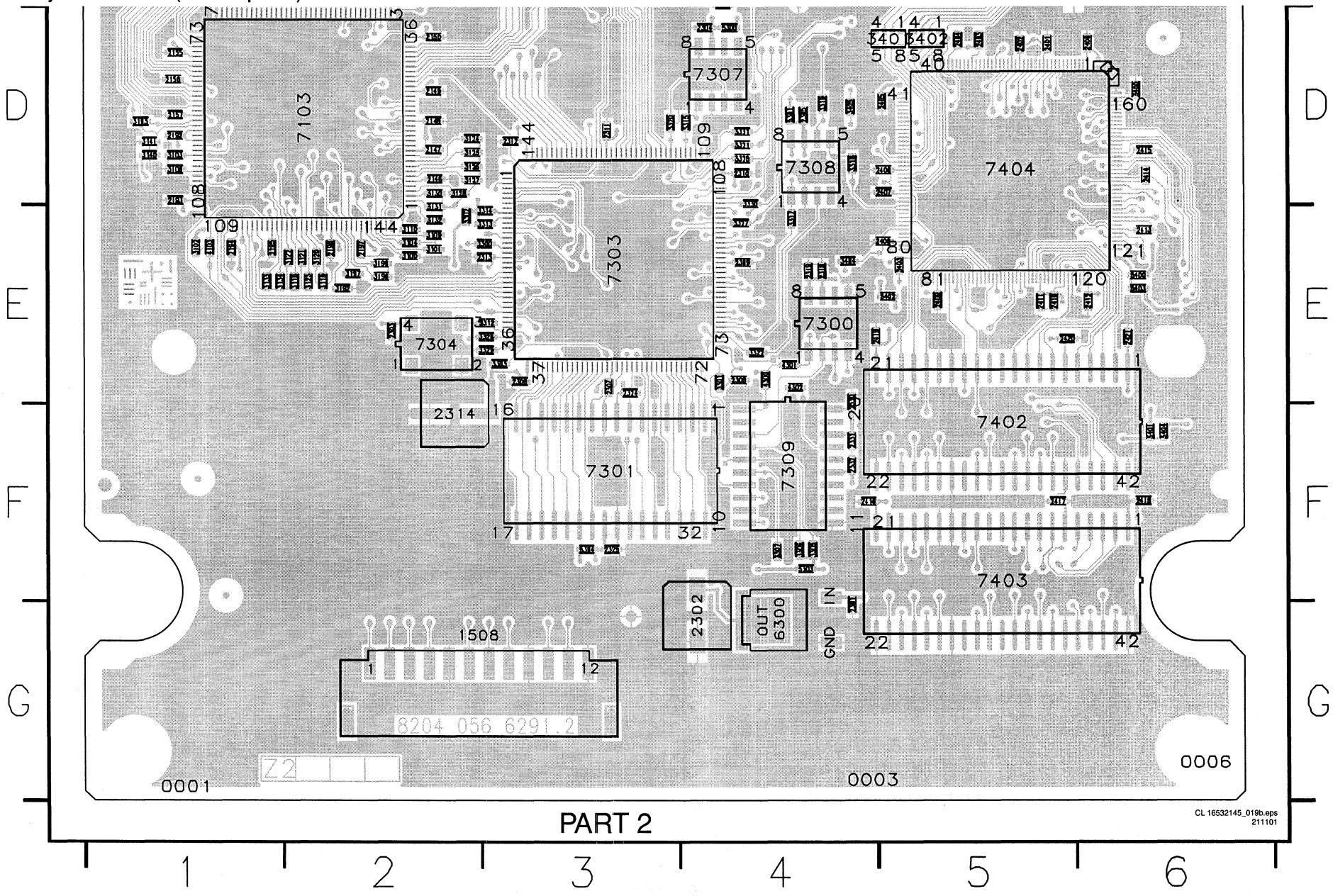
1101 A2	2332 F4	3130 D2	3331 D4	7403 F5
1102 B1	2400 D6	3131 E2	3400 D6	7404 D5
1200 B5	2401 D5	3132 E2	3401 D5	7500 B5
1201 A6	2402 D5	3133 E1	3402 D5	7505 B5
1500 C6	2403 D5	3134 E1	3403 E5	7506 B4
1501 A4	2404 D5	3136 B2	3404 E4	
1508 G2	2405 D5	3137 C2	3405 D4	
2104 B1	2406 D5	3138 B2	3502 B6	
2105 C1	2407 D5	3139 C2	3504 B6	
2146 D2	2408 E5	3140 D1	3505 B6	
2147 D2	2409 E5	3141 D1	3506 B6	
2148 D2	2410 E5	3147 B1	3510 B5	
2149 D2	2411 E5	3148 B1	3512 B5	
2150 D2	2412 E6	3164 B2	3518 A4	
2151 C2	2413 E6	3165 B2	3519 A4	
2152 C2	2414 D6	3166 C3	3520 A4	
2153 C1	2415 D6	3171 C1	3521 A4	
2154 C1	2416 F4	3172 C1	3524 B6	
2155 D1	2417 F5	3173 B2	3525 C5	
2156 D1	2418 F6	3174 C1	3526 B6	
2157 D1	2419 E4	3176 C1	3527 B6	
2158 A1	2420 E5	3177 B2	4100 C2	
2163 B2	2421 E6	3178 B2	4101 C2	
2170 B1	2500 A5	3179 C2	4102 C2	
2171 B1	2501 B5	3180 C2	4103 E1	
2173 C1	2502 B5	3188 C1	4206 B5	
2174 B1	2503 B6	3189 C1	4300 E4	
2175 B1	2504 C5	3190 C1	4301 E4	
2176 B1	2505 B4	3191 C2	4302 E4	
2177 B1	2506 B4	3192 E2	4500 B5	
2178 B2	2507 B5	3193 D1	4501 B5	
2181 A1	2508 B4	3197 E2	4505 B5	
2182 B2	2509 C6	3198 E2	5103 C2	
2183 B2	2510 B6	3199 E2	5106 C1	
2184 B2	2511 C5	3201 B5	5109 B1	
2187 B1	2512 C5	3202 C5	5110 B2	
2192 D1	2514 A4	3203 C5	5200 C5	
2193 D1	2515 A5	3204 C5	5300 D4	
2194 E1	2516 A4	3205 C5	5301 D4	
2195 E1	2517 A4	3206 C5	5302 E2	
2196 E2	2518 B4	3214 C5	5303 F4	
2197 E2	2519 B4	3215 C5	5304 F3	
2200 B4	3100 E2	3216 C5	5400 E6	
2202 C4	3101 E2	3217 C5	5401 F6	
2203 C4	3102 E1	3223 A6	5402 E5	
2204 C3	3103 D1	3224 B6	5403 E6	
2205 B5	3104 E2	3225 C4	5404 F6	
2206 C5	3105 C1	3226 C4	5500 A5	
2207 A6	3106 D1	3300 E3	5501 A5	
2301 G4	3107 C2	3301 E4	5502 B4	
2302 G4	3108 C2	3303 E3	5503 B4	
2303 E2	3109 E2	3305 F4	6300 G4	
2304 D4	3110 E2	3306 F4	7101 B1	
2305 D4	3111 C2	3307 F4	7103 D2	
2306 E3	3113 C2	3312 E3	7201 C3	
2307 E3	3115 C2	3313 E3	7202 C5	
2308 E4	3116 B1	3314 E3	7203 C4	
2309 E4	3117 C2	3315 D4	7204 C4	
2310 D4	3118 E2	3317 E4	7207 A6	
2311 D3	3119 E2	3318 D4	7208 C4	
2312 D3	3120 E2	3319 D4	7209 C4	
2313 E3	3121 E2	3320 D3	7300 E4	
2314 F2	3122 E2	3321 D4	7301 F3	
2318 E4	3123 E2	3322 E4	7303 E3	
2319 E4	3124 D2	3325 D4	7304 E2	
2324 E3	3125 D2	3327 E4	7307 D4	
2325 F3	3126 D2	3328 E3	7308 D4	
2330 E4	3127 D2	3329 E3	7309 F4	
2331 F4	3128 D2	3330 D4	7402 F5	

TR 01024_0

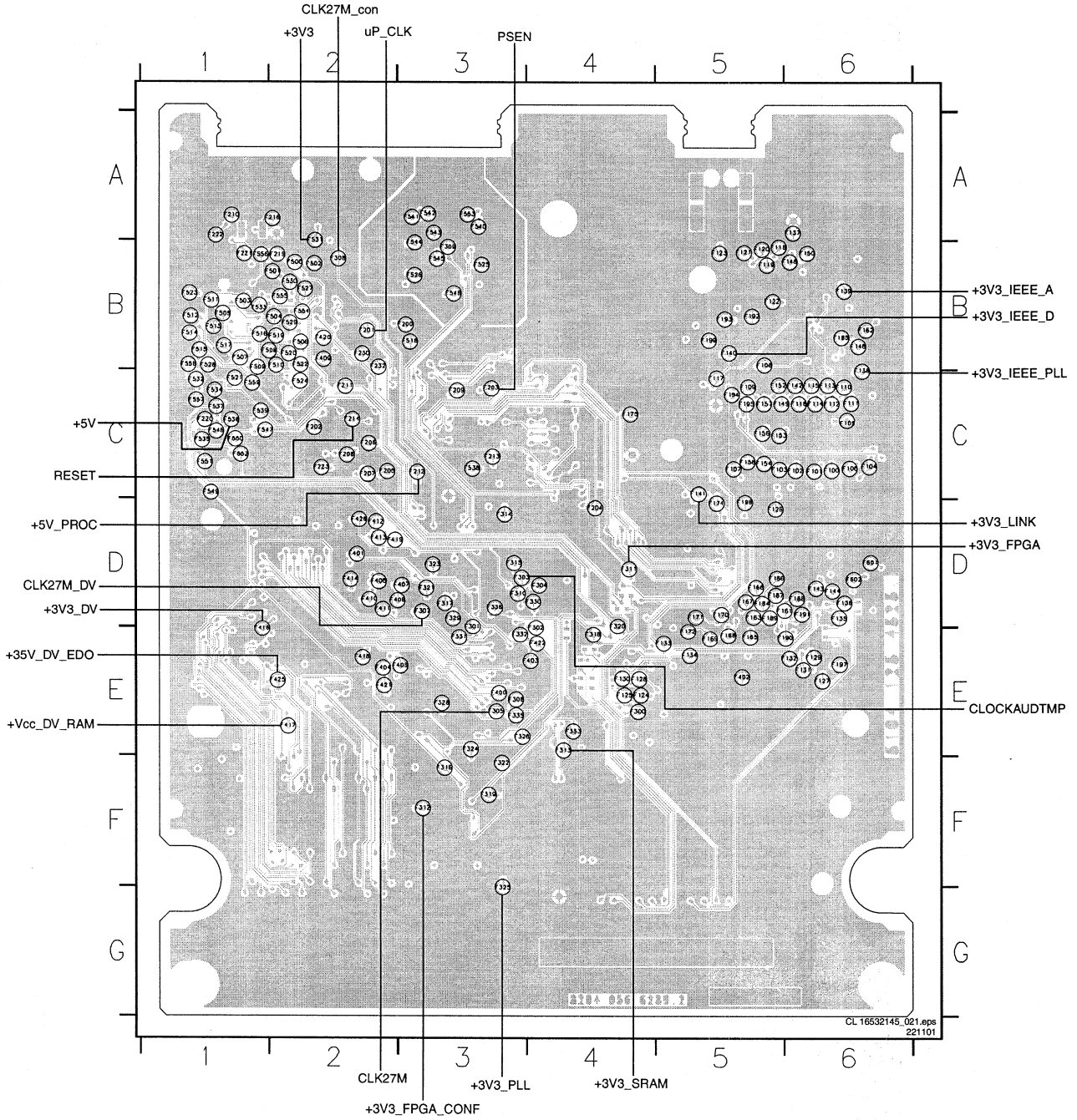
Layout DVIO Board (Part 1 Top View)



Layout DVIO Board (Part 2 Top View)



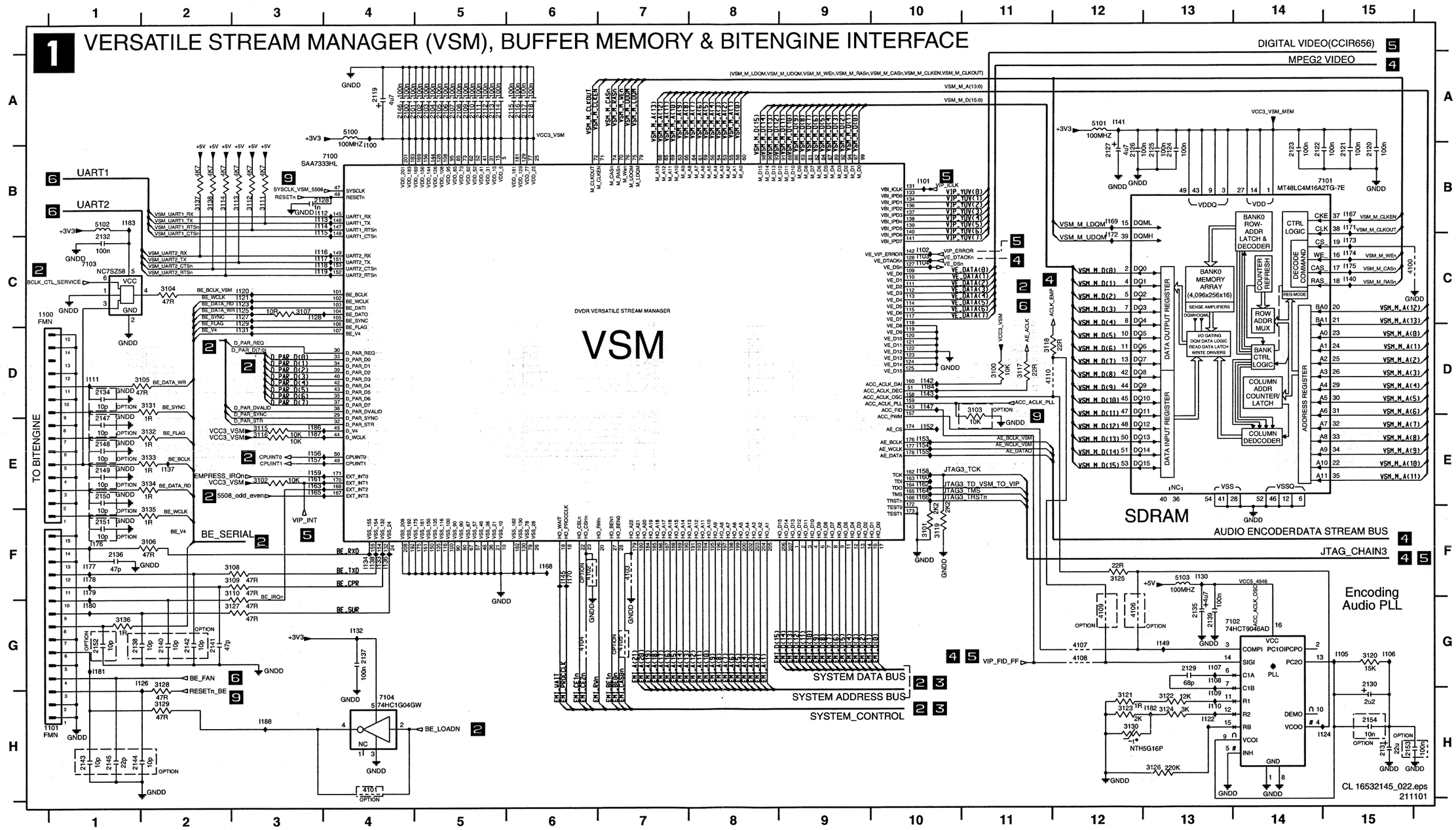
Layout DVIO Board (Testlands Bottom View)



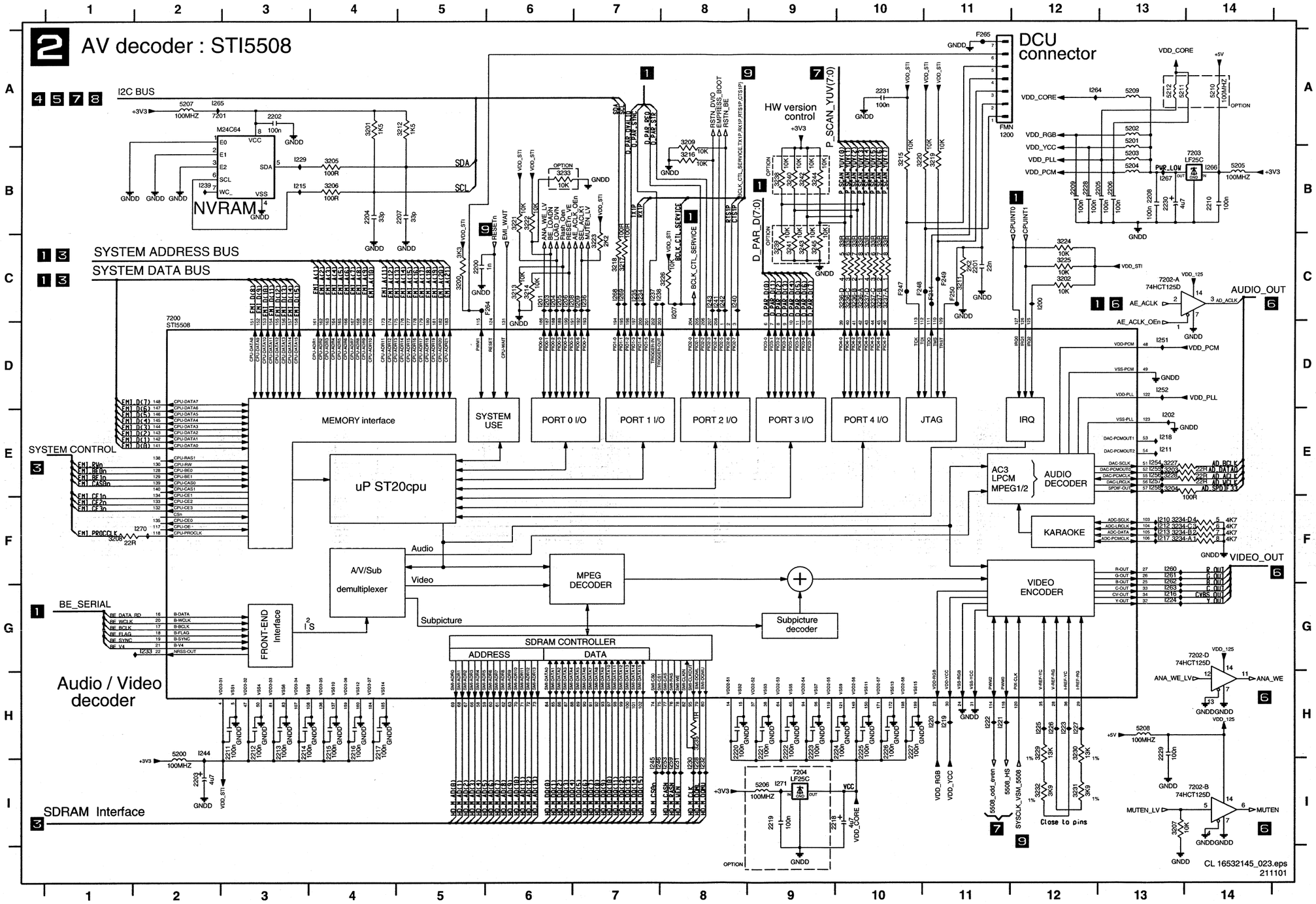
F100	C6	F144	D6	F206	C2	F328	E3	F513	B1
F100	C6	F146	B6	F206	C2	F329	D3	F513	B1
F101	C6	F146	B6	F207	C2	F329	D3	F514	B1
F101	C6	F148	B6	F207	C2	F330	D4	F514	B1
F102	C6	F148	B6	F208	C2	F330	D4	F515	B1
F102	C6	F149	C5	F208	C2	F331	E3	F515	B1
F103	C5	F149	C5	F209	C3	F331	E3	F516	B1
F103	C5	F150	B6	F209	C3	F332	E3	F516	B1
F104	C6	F150	B6	F210	A1	F332	E3	F517	B1
F104	C6	F152	C5	F210	A1	F333	E4	F517	B1
F105	C6	F152	C5	F211	C2	F333	E4	F518	B3
F105	C6	F153	C5	F211	C2	F335	E3	F518	B3
F106	C6	F153	C5	F212	C3	F335	E3	F519	B2
F106	C6	F154	C5	F212	C3	F336	D3	F519	B2
F107	C5	F154	C5	F213	C3	F336	D3	F520	B2
F107	C5	F156	C5	F213	C3	F400	E3	F520	B2
F108	B5	F156	C5	F214	C2	F400	E3	F521	C1
F108	B5	F157	C5	F214	C2	F401	D2	F521	C1
F109	C5	F157	C5	F216	A2	F401	D2	F522	B2
F109	C5	F158	C5	F216	A2	F402	E5	F522	B2
F110	C6	F158	C5	F219	B2	F402	E5	F523	B1
F110	C6	F161	D6	F219	B2	F403	E4	F523	B1
F111	C6	F161	D6	F220	C1	F403	E4	F524	C2
F111	C6	F162	B6	F220	C1	F404	E2	F524	C2
F112	C6	F162	B6	F221	B1	F404	E2	F525	B3
F112	C6	F163	D5	F221	B1	F405	E3	F525	B3
F113	C6	F163	D5	F222	A1	F405	E3	F526	B3
F113	C6	F165	E5	F222	A1	F406	D2	F526	B3
F114	C6	F165	E5	F223	C2	F406	D2	F527	B2
F114	C6	F166	D5	F223	C2	F407	D3	F527	B2
F115	C6	F166	D5	F230	B2	F407	D3	F528	B1
F115	C6	F167	D5	F230	B2	F408	D2	F528	B1
F116	C6	F167	D5	F232	B2	F408	D2	F529	B2
F116	C6	F168	E5	F232	B2	F409	B2	F529	B2
F117	C5	F168	E5	F300	E4	F409	B2	F530	B2
F117	C5	F169	E5	F300	E4	F410	D2	F530	B2
F118	B5	F169	E5	F301	D3	F410	D2	F531	A2
F118	B5	F170	D5	F301	D3	F411	D2	F531	B2
F119	B5	F170	D5	F302	E4	F411	D2	F532	C1
F119	B5	F171	D5	F302	E4	F412	D2	F532	C1
F120	B5	F171	D5	F303	D3	F412	D2	F533	B1
F120	B5	F172	E5	F303	D3	F413	D2	F533	B1
F121	B5	F172	E5	F304	D4	F413	D2	F534	C1
F121	B5	F174	D5	F304	D4	F414	D2	F534	C1
F122	B5	F174	D5	F305	E3	F414	D2	F535	C1
F122	B5	F175	C4	F305	E3	F416	E1	F535	C1
F123	B5	F175	C4	F306	E3	F416	E1	F536	C1
F123	B5	F184	D5	F306	E3	F417	E2	F536	C1
F124	E4	F184	D5	F307	D3	F417	E2	F537	C1
F124	E4	F185	B6	F307	D3	F418	E2	F537	C1
F125	E4	F185	B6	F308	B2	F418	E2	F538	C3
F125	E4	F186	D5	F308	B2	F419	D2	F538	C3
F126	D5	F186	D5	F309	B3	F419	D2	F539	C1
F126	D5	F187	D5	F309	B3	F420	B2	F539	C1
F127	E6	F187	D5	F310	D3	F420	B2	F540	A3
F127	E6	F188	D6	F310	D3	F421	E2	F540	A3
F128	E4	F188	D6	F311	D4	F421	E2	F541	A3
F128	E4	F189	D5	F311	D4	F422	E4	F541	A3
F129	E6	F189	D5	F312	F3	F422	E4	F542	A3
F129	E6	F190	E6	F312	F3	F425	E2	F542	A3
F130	E4	F190	E6	F313	E4	F425	E2	F543	A3
F130	E4	F191	D6	F313	E4	F426	D2	F543	A3
F131	E6	F191	D6	F314	D3	F426	D2	F544	B3
F131	E6	F192	B5	F314	D3	F500	B2	F544	B3
F132	E6	F192	B5	F315	D3	F500	B2	F545	B3
F132	E6	F193	B5	F315	D3	F501	B2	F545	B3
F133	E5	F193	B5	F316	F3	F501	B2	F546	C1
F133	E5	F194	C5	F316	F3	F502	B2	F546	C1
F134	E5	F194	C5	F317	D3	F502	B2	F547	C1
F134	E5	F195	C5	F317	D3	F503	B1	F547	C1
F135	D6	F195	C5	F318	E4	F503	B1	F548	B3
F135	D6	F197	E6	F318	E4	F504	B2	F548	B3
F136	D6	F197	E6	F319	F3	F504	B2	F549	C1
F136	D6	F198	D5	F319	F3	F505	B1	F549	C1
F137	A6	F198	D5	F320	D4	F505	B1	F550	C1
F137	A6	F199	B5	F320	D4	F506	B2	F550	C1
F138	C6	F199	B5	F321	D3	F506	B2	F551	C1
F138	C6	F200	B3	F321	D3	F507	B1	F551	C1
F139	B6	F200	B3	F322	F3	F507	B1	F552	C1
F139	B6	F201	B2	F322	F3	F508	B2	F552	C1
F140	B5	F201	B2	F323	D3	F508	B2	F553	A3
F140	B5	F202	C2	F323	D3	F509	B1	F553	A3
F141	C5	F202	C2	F324	E3	F509	B1	F554	B2
F141	C5	F203	C3	F324	E3	F510	B2	F554	B2
F142	C6	F203	C3	F325	G3	F510	B2	F555	B2
F142	C6	F204	D4	F325	G3	F511	B1	F555	B2
F143	D6	F204	D4	F326	E3	F511	B1	F556	B1
F143	D6	F205	C2	F326	E3	F512	B1	F556	B1
F144	D6	F205	C2	F328	E3	F512	B1	F557	C1

Digital Board: VSM, Buffer Memory and Bit Engine Interface

1100	C1	2106	A5	2114	A5	2122	B14	2130	G15	2139	G13	2147	D1	3102	E3	3110	F3	3118	D11	3126	H12	3134	E2	4103	F7	7101	B14
1101	H1	2107	A5	2115	A6	2123	B14	2131	H15	2140	G2	2148	E1	3103	D11	3111	B3	3119	F10	3127	G3	3135	E2	4104	G6	7102	G13
2100	A4	2108	A5	2116	A6	2124	B13	2132	B1	2141	G2	2149	E1	3104	C2	3112	B3	3120	G15	3128	G2	3136	G1	4105	G7	7103	C1
2101	A5	2109	A5	2117	A6	2125	B13	2134	D1	2142	G2	2150	E1	3105	D2	3113	B3	3121	G12	3129	H2	3137	B2	5100	A4	7104	H4
2102	A5	2110	A5	2118	A6	2126	B12	2135	G13	2143	H1	2151	F1	3106	F2	3114	B2	3122	H12	3130	H12	3138	B2	5101	A12		
2103	A5	2111	A5	2119	A4	2127	B12	2136	F1	2144	H1	2152	G1	3107	C3	3115	E3	3123	H12	3131	D2	4100	C15	5102	B1		
2104	A5	2112	A5	2120	B15	2128	B3	2137	G4	2145	H1	3100	D11	3108	F3	3116	E3	3124	H12	3132	E2	4101	H4	5103	F13		
2105	A5	2113	A5	2121	B15	2129	G13	2138	G1	2146	A4	3101	F10	3109	F3	3117	D11	3125	G14	3133	E2	4102	F6	7100	B4		



Digital Board: AV Decoder STI5508



1200	A11	5207	A2
2200	C5	5208	H13
2201	C11	5209	A13
2202	A3	5210	A14
2203	I2	5211	A13
2204	B4	5212	A13
2205	B13	7200	C2
2206	B13	7201	A2
2207	B5	7202-A	C13
2208	B13	7202-B	I14
2209	B12	7202-D	G14
2210	B14	7203	B14
2211	H3	7204	I9
2212	H3	F214	C11
2213	H3	F247	C10
2214	H3	F248	C10
2215	H4	F249	C11
2216	H4	F250	C11
2217	H4	F264	C6
2218	I10	F265	A11
2219	I9		
2220	H8		
2221	H9		
2222	H9		
2223	H9		
2224	H10		
2225	H10		
2226	H10		
2227	H10		
2228	B12		
2229	H13		
2230	B13		
2231	A10		
3200	C5		
3201	A4		
3202	C12		
3203	E13		
3204	E13		
3205	B4		
3206	B4		
3207	I13		
3208	F1		
3209	A8		
3211	C11		
3212	A5		
3213	C6		
3214	C6		
3215	B10		
3216	B8		
3217	C7		
3218	C7		
3219	B11		
3220	B10		
3221	B6		
3222	B6		
3223	C7		
3224	C12		
3225	C12		
3226	C8		
3227	E13		
3228	E13		
3229	H12		
3230	H12		
3231	I12		
3232	I12		
3233	B6		
3234-A	F13		
3234-B	F13		
3234-C	F13		
3234-D	F13		
3235	H8		
3236-A	C10		
3236-B	C10		
3236-C	C10		
3236-D	C10		
3237-A	C10		
3237-B	C10		
3237-C	C10		
3237-D	C10		
3238	B9		
3239	C9		
3240	B9		
3241	C9		
3242	B9		
3243	C9		
3244	B9		
3245	C9		
5200	H2		
5201	A13		
5202	A13		
5203	B13		
5204	B13		
5205	B14		
5206	I9		

Digital Board: AV Decoder Memory

3 AV Decoder Memory

2 SDRAM Interface

1 2 SYSTEM DATA BUS

1 2 SYSTEM ADDRESS BUS

1 2 SYSTEM CONTROL
(EMI_RWn,FLASH_OEN,EMI_CE2n,EMI_CE3n)

SDRAM

I300 VDD_STI 2311 4u7 GNDD

7300 MT48LC4M16A2TG-7E
1 14 27 3 9 43 49
VDD VDDQ

2308 2309 2310 2303 2301 2300 2302 100n GNDD

VDD_STI	37	CKE	
HD_M_CLK	38	CLK	
HD_M_CSBn	19	CS_	
HD_M_WEN	16	WE_	
HD_M_CASN	17	CAS_	
HD_M_RASN	18	RAS_	
HD_M_AD(12)	20	BA0	
HD_M_AD(13)	21	BA1	
HD_M_AD(0)	23	A0	
HD_M_AD(1)	24	A1	
HD_M_AD(2)	25	A2	
HD_M_AD(3)	26	A3	
HD_M_AD(4)	29	A4	
HD_M_AD(5)	30	A5	
HD_M_AD(6)	31	A6	
HD_M_AD(7)	32	A7	
HD_M_AD(8)	33	A8	
HD_M_AD(9)	34	A9	
HD_M_AD(10)	22	A10	
HD_M_AD(11)	35	A11	

CTRL LOGIC; COMMAND DECODE; MODE REG; REFRESH COUNTER; ROW ADDR MUX; BANK CTRL LOGIC; COLUMN ADDR COUNTER/ LATCH; COLUMN DEDCODER; ADDRESS REGISTER

BANK0 ROW-ADDR LATCH & DECODER

BANK0 MEMORY ARRAY (4,096x256x16); SENSE AMPLIFIERS; DQML DQMH; I/O GATING DQM DATA LOGIC READ DATA LATCH WRITE DRIVERS

DATA OUTPUT REGISTER; DATA INPUT REGISTER

DQML	15	HD_M_DQML	
DQMH	39	HD_M_DQMH	
DQ0	2	HD_M_DQ(0)	
DQ1	4	HD_M_DQ(1)	
DQ2	5	HD_M_DQ(2)	
DQ3	7	HD_M_DQ(3)	
DQ4	8	HD_M_DQ(4)	
DQ5	10	HD_M_DQ(5)	
DQ6	11	HD_M_DQ(6)	
DQ7	13	HD_M_DQ(7)	
DQ8	42	HD_M_DQ(8)	
DQ9	44	HD_M_DQ(9)	
DQ10	45	HD_M_DQ(10)	
DQ11	47	HD_M_DQ(11)	
DQ12	48	HD_M_DQ(12)	
DQ13	50	HD_M_DQ(13)	
DQ14	51	HD_M_DQ(14)	
DQ15	53	HD_M_DQ(15)	

VSSQ 6 12 46 52; VSS 28 41 54; NC 36 40; GNDD

FLASH 1

VDD_FLASH_L; 5300 100MHZ; 2305 4u7; 2306 100n; GNDD

7302 M29W160DT 37 VCC

EMI_A(1)	25	A0	
EMI_A(2)	24	A1	
EMI_A(3)	23	A2	
EMI_A(4)	22	A3	
EMI_A(5)	21	A4	
EMI_A(6)	20	A5	
EMI_A(7)	19	A6	
EMI_A(8)	18	A7	
EMI_A(9)	8	A8	
EMI_A(10)	7	A9	
EMI_A(11)	6	A10	
EMI_A(12)	5	A11	
EMI_A(13)	4	A12	
EMI_A(14)	3	A13	
EMI_A(15)	2	A14	
EMI_A(16)	1	A15	
EMI_A(17)	48	A16	
EMI_A(18)	17	A17	
EMI_A(19)	16	A18	
EMI_A(20)	9	A19	
	15	RB_	
ROML_CEn I302	26	E_	
FLASH_OEN	28	G_	
EMI_RWn	11	W_	
I304	12	RP_	
VDD_FLASH_L	47	BYTE_	

DQ0	29	EMI_D(0)	
DQ1	31	EMI_D(1)	
DQ2	33	EMI_D(2)	
DQ3	35	EMI_D(3)	
DQ4	38	EMI_D(4)	
DQ5	40	EMI_D(5)	
DQ6	42	EMI_D(6)	
DQ7	44	EMI_D(7)	
DQ8	30	EMI_D(8)	
DQ9	32	EMI_D(9)	
DQ10	34	EMI_D(10)	
DQ11	36	EMI_D(11)	
DQ12	39	EMI_D(12)	
DQ13	41	EMI_D(13)	
DQ14	43	EMI_D(14)	
DQ15/A-1	45	EMI_D(15)	
NC	14		
	13		
	10		
VSS1	27		
VSS2	46		

GNDD

FLASH 2

VDD_FLASH_H; 5302 100MHZ; I301; 2304 4u7; 2307 100n; GNDD

7301 M29W160DT 37 VCC

EMI_A(1)	25	A0	
EMI_A(2)	24	A1	
EMI_A(3)	23	A2	
EMI_A(4)	22	A3	
EMI_A(5)	21	A4	
EMI_A(6)	20	A5	
EMI_A(7)	19	A6	
EMI_A(8)	18	A7	
EMI_A(9)	8	A8	
EMI_A(10)	7	A9	
EMI_A(11)	6	A10	
EMI_A(12)	5	A11	
EMI_A(13)	4	A12	
EMI_A(14)	3	A13	
EMI_A(15)	2	A14	
EMI_A(16)	1	A15	
EMI_A(17)	48	A16	
EMI_A(18)	17	A17	
EMI_A(19)	16	A18	
EMI_A(20)	9	A19	
	15	RB_	
ROMH_CEn I303	26	E_	
FLASH_OEN	28	G_	
EMI_RWn	11	W_	
	12	RP_	
VDD_FLASH_H	47	BYTE_	

DQ0	29	EMI_D(0)	
DQ1	31	EMI_D(1)	
DQ2	33	EMI_D(2)	
DQ3	35	EMI_D(3)	
DQ4	38	EMI_D(4)	
DQ5	40	EMI_D(5)	
DQ6	42	EMI_D(6)	
DQ7	44	EMI_D(7)	
DQ8	30	EMI_D(8)	
DQ9	32	EMI_D(9)	
DQ10	34	EMI_D(10)	
DQ11	36	EMI_D(11)	
DQ12	39	EMI_D(12)	
DQ13	41	EMI_D(13)	
DQ14	43	EMI_D(14)	
DQ15/A-1	45	EMI_D(15)	
NC	14		
	13		
	10		
VSS1	27		
VSS2	46		

GNDD

SYSTEM CONTROL

EMI_CE3n; EMI_CE2n

7303-A 74LVC00AD 14: 1 2 3 — GNDD; VDD_FLASH_L

7303-B 74LVC00AD 14: 4 5 6 — GNDD; VDD_FLASH_L; 2312 100n GNDD; I307 3300 47R ROMH_CEn; I306 4300 OPTION

7303-C 74LVC00AD 14: 9 10 8 — GNDD; VDD_FLASH_L

7303-D 74LVC00AD 14: 12 13 11 — GNDD; VDD_FLASH_L; I309 3301 47R ROML_CEn; 4301 OPTION

I305; I308; EMI_A(21)

2300	A14
2301	A14
2302	A14
2303	A13
2304	B8
2305	B6
2306	B6
2307	B9
2308	A13
2309	A13
2310	A13
2311	A11
2312	H7
3300	H8
3301	I8
4300	H9
4301	I9
5300	B5
5302	B8
7300	A11
7301	B8
7302	B6
7303-A	H6
7303-B	H7
7303-C	I6
7303-D	I7

CL 16532145024.eps
221101

Digital Board: Video Encoder, Empress

4 Video Encoder Empress

SRAM

SDRAM

EMPRESS

MPEG2 / AC-3 encoder

MPEG2 VIDEO

DIGITAL VIDEO(CCIR656)

I2C BUS

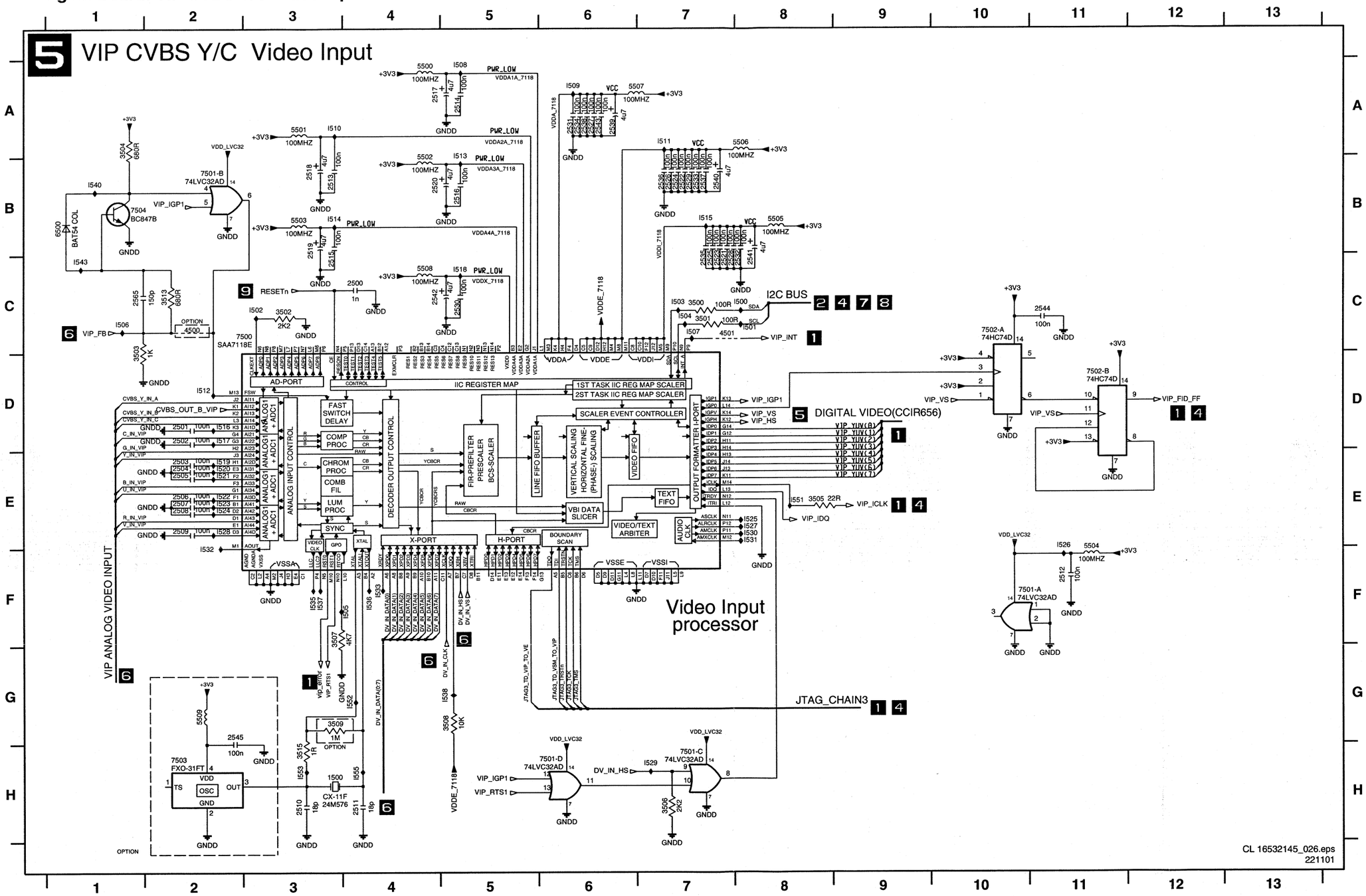
AUDIO ENCODERDATA STREAM BUS

JTAG_CHAIN3

CL 16532145_025.eps
221101

2402	A1
2403	A1
2404	B11
2405	B11
2406	B11
2407	B11
2408	B11
2409	B11
2410	B11
2411	A12
2412	I13
2413	I13
2414	I13
2415	I12
2416	I12
2417	I12
2418	I12
2419	I12
2420	I12
2421	I12
2422	I11
2423	I11
2424	I11
2425	I11
2426	I11
2427	I11
2428	I11
2429	I10
2430	I10
2431	I10
2432	I3
2433	I3
2434	I3
2435	I3
2436	I3
2437	I3
2438	I3
2439	I2
2440	I2
2441	I2
2442	I2
2443	B13
2444	A1
2446	H9
3400	G9
3401	G9
3402	G13
3403	G4
3404	B13
3405	G4
3406	H10
3407	H9
3408	G8
3409	G8
3410	G8
4406	F13
4409	G12
5400	B12
5402	A2
5403	H1
5404	I10
7401	B2
7402	B12
7403	B8
7404	H2

Digital Board: VIP CVBS Y/C Video Input



1500	H3
2500	C4
2501	D2
2502	D2
2503	E2
2504	E2
2505	E2
2506	E2
2507	E2
2508	E2
2509	E2
2510	H3
2511	H4
2512	F11
2513	B3
2514	A5
2515	C3
2516	B5
2517	A4
2518	B3
2519	B3
2520	B4
2521	C7
2522	B7
2523	C7
2524	B7
2525	C7
2526	B7
2527	A6
2528	C7
2529	B7
2530	C5
2531	A6
2532	C8
2533	B7
2534	A6
2535	C7
2536	B7
2537	B7
2538	A6
2539	A6
2540	B7
2541	B8
2542	C4
2543	A6
2544	C11
2545	G2
2565	C1
3500	C7
3501	C7
3502	C3
3503	C1
3504	A1
3505	E8
3506	H7
3507	F3
3508	G5
3509	G3
3513	C2
3515	H3
4500	C2
4501	C7
5500	A4
5501	A3
5502	A4
5503	B3
5504	E11
5505	B8
5506	A8
5507	A6
5508	C4
5509	G2
6500	B1
7500	C3
7501-A	F11
7501-B	B2
7501-C	H7
7501-D	H6
7502-A	C10
7502-B	D11
7503	H2
7504	B1

Digital Board: Analog Board Cons. Video In / Output

6 Analog Board Cons. Video In / Output

VIP ANALOG VIDEO INPUT

AUDIO ENCODER DATA STREAM BUS

AUDIO OUT

VIDEO_OUT

DV_IN_DATA(0:7)

1603 DIVIO 84816

UART2

ANALOG BOARD INTERFACE AUDIO IN/OUT

ANALOG BOARD INTERFACE VIDEO IN/OUT

ANALOG BOARD INTERFACE CONTROL

UART1

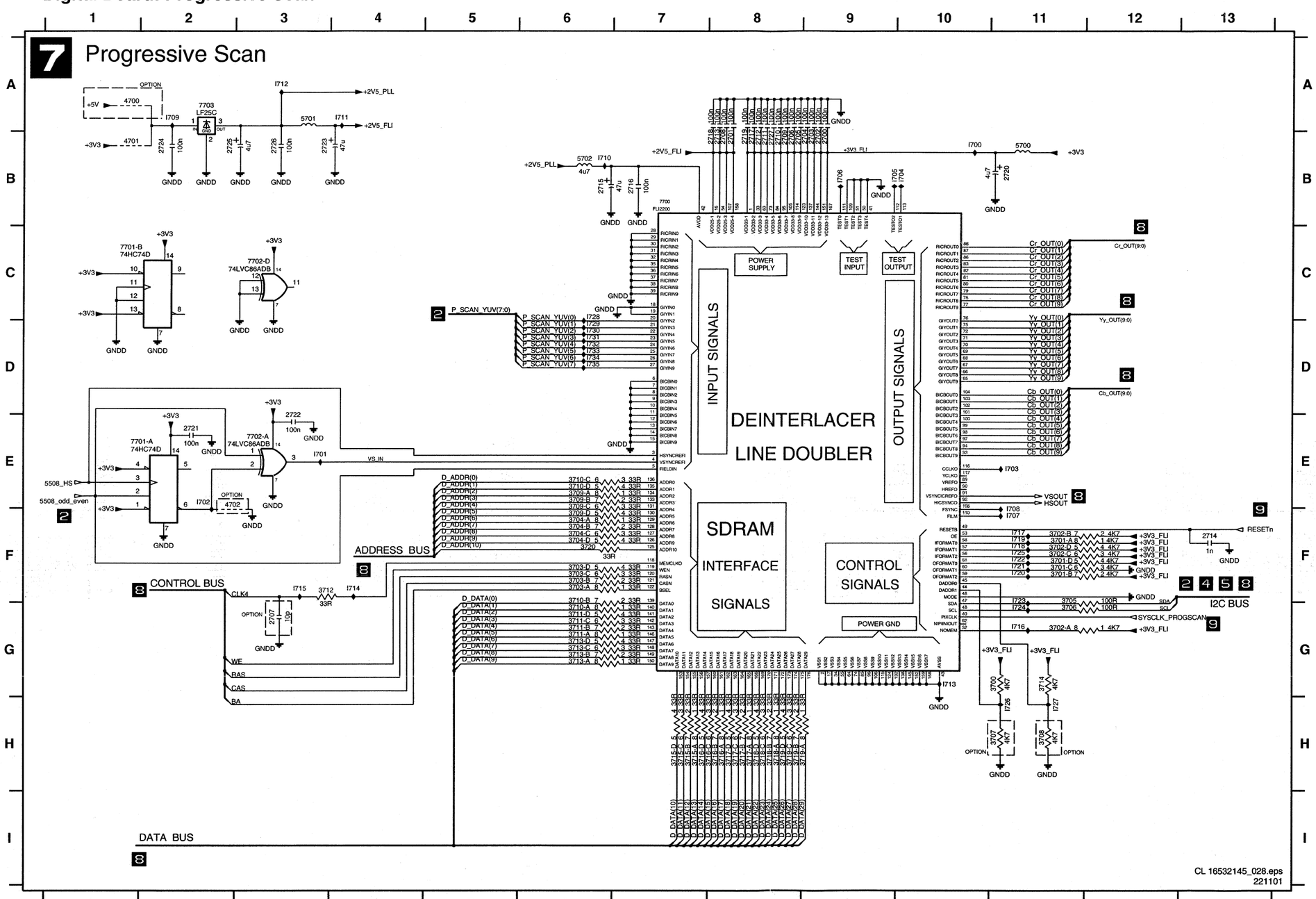
1600 FMN

CL 16532145_027.eps 221101

1600	H14	7202-C	D12		
1601	D14	7600	E6		
1602	C14	7601	G10		
1603	E2	7602	B3		
2600	E6	7603	G6		
2601	E5	7604	I10		
2602	E5	7605	I6		
2603	C12	7606	E10		
2604	C13				
2605	E10				
2606	E9				
2607	E9				
2608	A6				
2609	A6				
2610	G6				
2611	G5				
2612	G5				
2613	A9				
2614	B9				
2615	F10				
2616	G9				
2617	G9				
2618	A9				
2619	C9				
2620	H6				
2621	I5				
2622	I5				
2623	C12				
2624	C12				
2625	H10				
2626	I9				
2627	I9				
2628	C6				
2629	A6				
2630	A2				
2631	C12				
2632	A2				
2633	B9				
2634	B2				
2635	C9				
2636	H9				
3600	D13				
3601	E5				
3602	E6				
3603	F6				
3604	B12				
3605	A10				
3606	E8				
3607	E9				
3608	F10				
3609	A9				
3610	C10				
3611	G5				
3612	G6				
3613	H6				
3614	C9				
3615	B3				
3616	G8				
3617	G9				
3618	G10				
3619	B2				
3620	F1				
3621	I5				
3622	I6				
3623	A12				
3624	I6				
3625	A12				
3626	I8				
3627	I9				
3628	I10				
3629	A6				
3630	C6				
3631	B10				
3632	B6				
3633	C6				
3634	B9				
3635	B12				
3636	B2				
3637	B12				
3638	B3				
4600	G3				
4601	G1				
4602	G3				
5600	E5				
5601	G9				
5602	I5				
5603	G5				
5604	I9				
5605	E9				
5606	A2				
5607	H9				

Digital Board: Progressive Scan

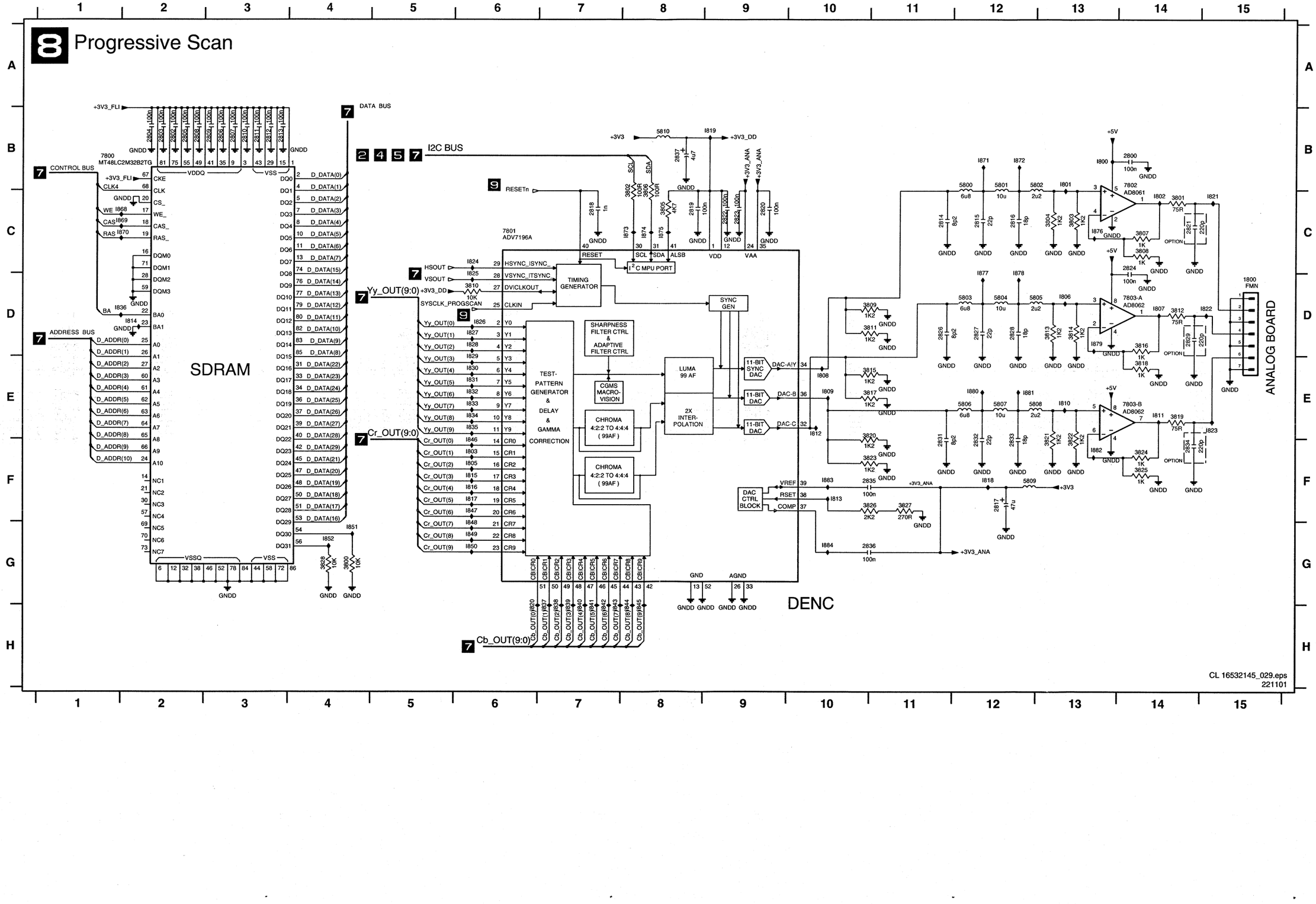
7 Progressive Scan



2700	B9	3719-A	H9
2701	B8	3719-B	H8
2702	B9	3719-C	H8
2703	B9	3719-D	H8
2704	B9	3720	F6
2705	B8	4700	A1
2706	B8	4701	B1
2707	G3	4702	E2
2708	B8	5700	B11
2709	B8	5701	A3
2710	B8	5702	B6
2711	B8	7700	B7
2712	B8	7701-A	E1
2713	B8	7701-B	C1
2714	F13	7702-A	E3
2715	B6	7702-D	C3
2716	B7	7703	A2
2717	B8		
2718	B8		
2719	B8		
2720	B11		
2721	E2		
2722	E3		
2723	B3		
2724	B2		
2725	B2		
2726	B3		
2727	B8		
3700	G11		
3701-A	F11		
3701-B	F11		
3701-C	F11		
3701-D	F11		
3702-A	G11		
3702-B	F11		
3702-C	F11		
3702-D	F11		
3703-A	F6		
3703-B	F6		
3703-C	F6		
3703-D	F6		
3704-A	F6		
3704-B	F6		
3704-C	F6		
3704-D	F6		
3705	G11		
3706	G11		
3707	H11		
3708	H11		
3709-A	E6		
3709-B	E6		
3709-C	F6		
3709-D	F6		
3710-A	G6		
3710-B	G6		
3710-C	E6		
3710-D	E6		
3711-A	G6		
3711-B	G6		
3711-C	G6		
3711-D	G6		
3712	F3		
3713-A	G6		
3713-B	G6		
3713-C	G6		
3713-D	G6		
3714	G11		
3715-A	H7		
3715-B	H7		
3715-C	H7		
3715-D	H7		
3716-A	H8		
3716-B	H8		
3716-C	H8		
3716-D	H7		
3717-A	H8		
3717-B	H8		
3717-C	H8		
3717-D	H8		
3718-A	H8		
3718-B	H8		
3718-C	H8		
3718-D	H8		

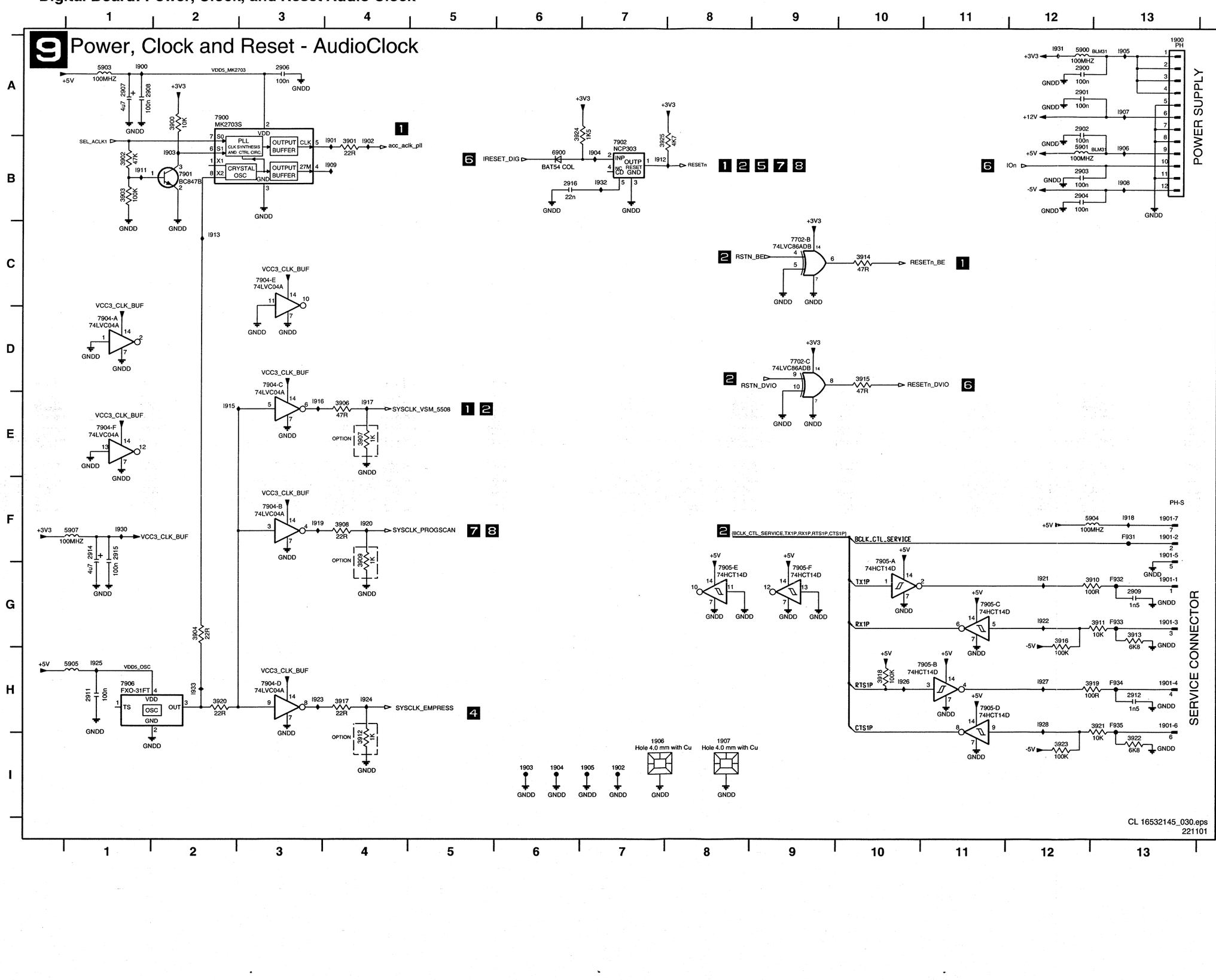
Digital Board: Progressive Scan

1800	D15	2806	B3	2812	B3	2818	C7	2824	C14	2832	E12	3800	G4	3806	B8	3812	D14	3818	E14	3824	F14	5801	B12	5807	E12	7802	B14
2800	B14	2807	B3	2813	B3	2819	C8	2826	D11	2833	E12	3801	C14	3807	C14	3813	D13	3819	E14	3825	F14	5802	B12	5808	E12	7803-A	D14
2802	B2	2808	B2	2814	C11	2820	C9	2827	D12	2834	F14	3802	B8	3808	C14	3814	D13	3820	E10	3826	F11	5803	D12	5809	F12	7803-B	E14
2803	B2	2809	B3	2815	C12	2821	C14	2828	D12	2835	F10	3803	C13	3809	D10	3815	E10	3821	E13	3827	F11	5804	D12	5810	B8		
2804	B2	2810	B3	2816	C12	2822	C9	2829	D14	2836	G10	3804	C13	3810	D6	3816	D14	3822	E13	3828	G4	5805	D12	7800	B1		
2805	B2	2811	B3	2817	F12	2823	C9	2831	E11	2837	B8	3805	C8	3811	D11	3817	E11	3823	F11	5800	B12	5806	E12	7801	C6		



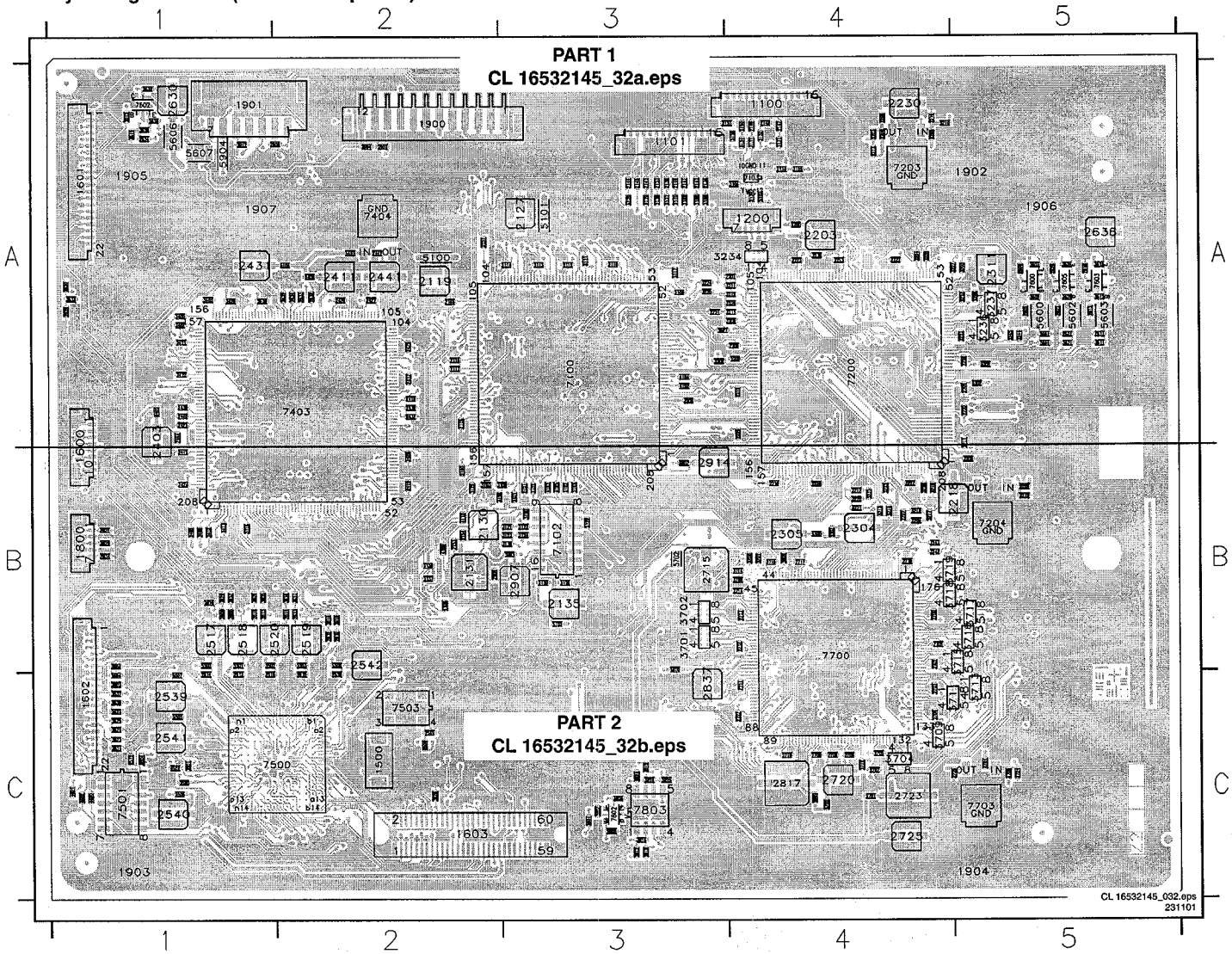
Digital Board: Power, Clock, and Reset Audio Clock

9 Power, Clock and Reset - AudioClock



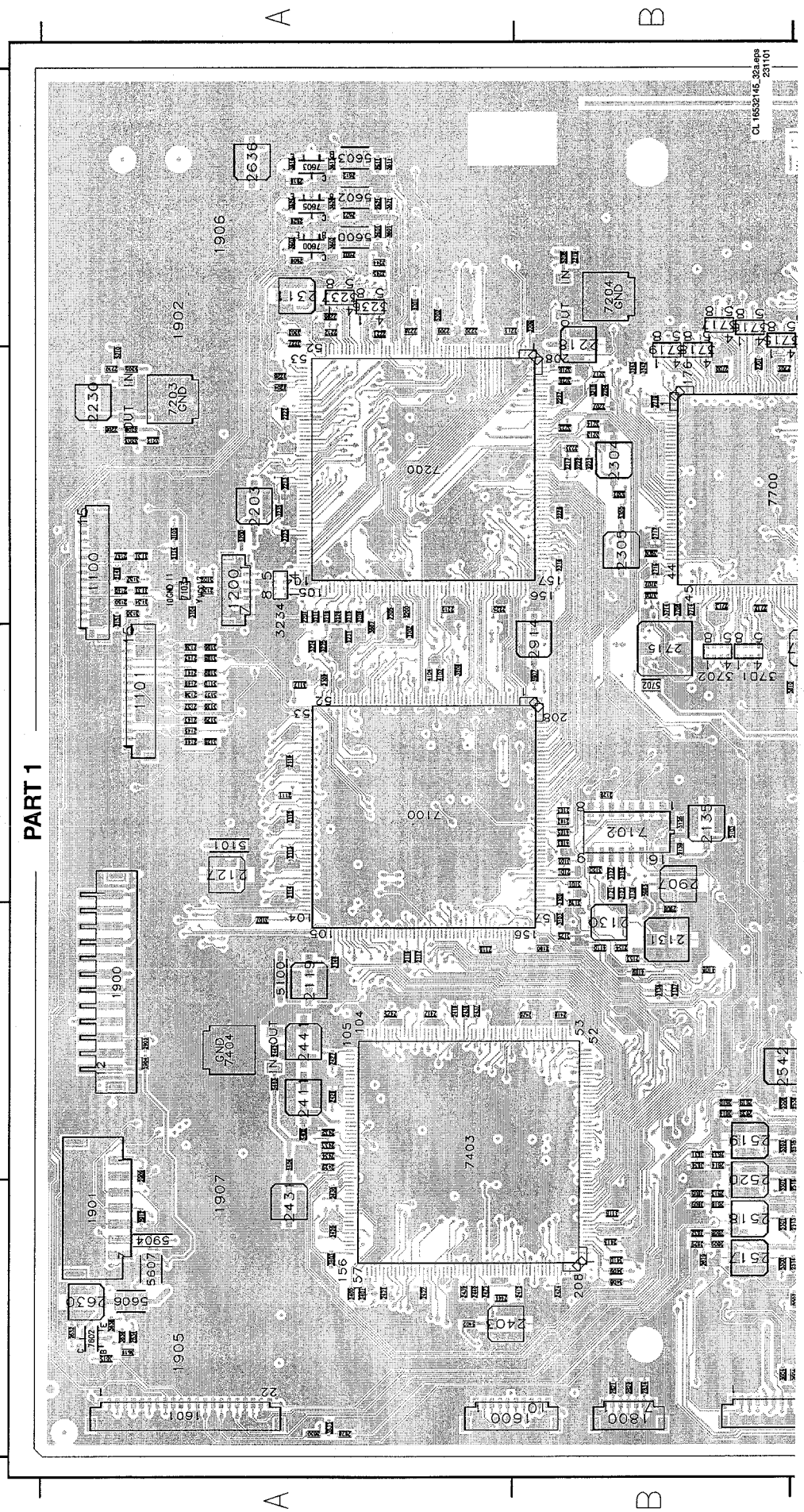
1900	A13
1901-1	G13
1901-2	F13
1901-3	G13
1901-4	H13
1901-5	F13
1901-6	H13
1901-7	F13
1902	I7
1903	I6
1904	I6
1905	I7
1906	I7
1907	I8
2900	A12
2901	A12
2902	A12
2903	B12
2904	B12
2906	A3
2907	A1
2908	A1
2909	G13
2911	H1
2912	H13
2914	F1
2915	F1
2916	B6
3900	A2
3901	B4
3902	B1
3903	B1
3904	G2
3906	E4
3907	E4
3908	F4
3909	F4
3910	G13
3911	G13
3912	I4
3913	G13
3914	C10
3915	D10
3916	G12
3917	H4
3918	H10
3919	H13
3920	H2
3921	H13
3922	I13
3923	I12
3924	A6
3925	B7
5900	A12
5901	B12
5903	A1
5904	F13
5905	H1
5907	F1
6900	B6
7702-B	C9
7702-C	D9
7900	A2
7901	B2
7902	B7
7904-A	D1
7904-B	F3
7904-C	D3
7904-D	H3
7904-E	C3
7904-F	E1
7905-A	G10
7905-B	H10
7905-C	G11
7905-D	H11
7905-E	G8
7905-F	G9
7906	H1
F931	F13
F932	G13
F933	G13
F934	H13
F935	H13

Layout Digital Board (Overview Top View)

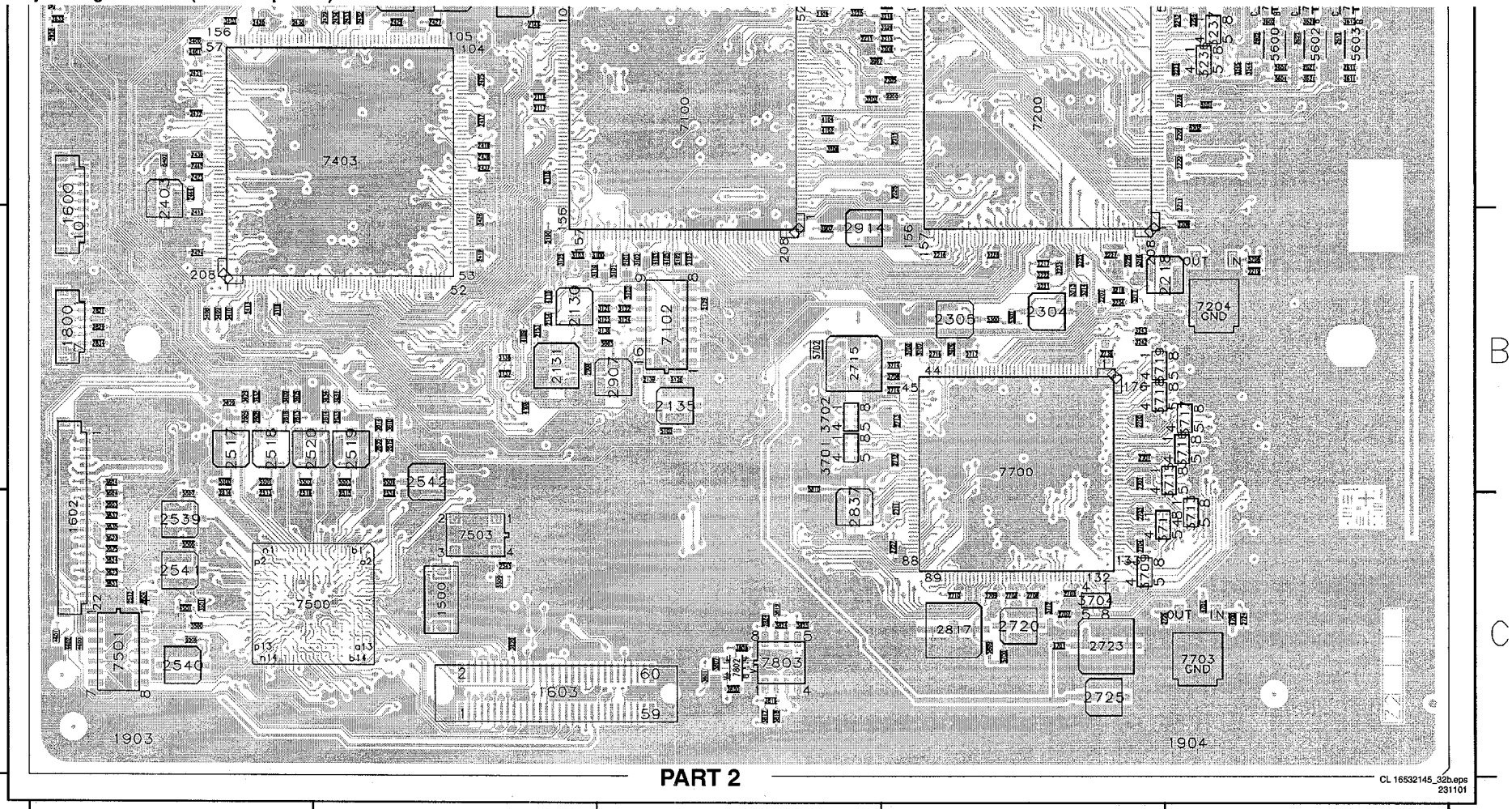


1100	A4	2311	A5	2707	C4	3221	B4	3909	B4
1101	A3	2403	A1	2708	C4	3222	B4	4102	A3
1200	A4	2411	A2	2709	C4	3223	B4	4103	B3
1500	C2	2412	B1	2710	C4	3224	A3	4104	A3
1600	A1	2413	B1	2711	C4	3225	A3	4105	B3
1601	A1	2417	A2	2712	B4	3226	B4	4108	B2
1602	C1	2418	A2	2713	B4	3227	A5	4109	B2
1603	C2	2419	B2	2714	B4	3228	A4	4110	B2
1800	B1	2420	A1	2715	B3	3233	B4	4501	C1
1900	A2	2421	A1	2716	B4	3234	A4	4600	C1
1901	A1	2422	A1	2717	B4	3235	A4	4601	C1
2100	B2	2423	A1	2719	B4	3236	A5	4602	C1
2101	B3	2424	B1	2720	C4	3237	A5	4700	C5
2102	B3	2425	A2	2723	C4	3242	B4	4701	C5
2103	B3	2426	B2	2724	C5	3243	B4	5100	A2
2109	A3	2427	A2	2725	C4	3244	A5	5101	A3
2110	A3	2428	A2	2726	C4	3245	A5	5102	A4
2111	A3	2429	A2	2727	C4	3400	A1	5103	B3
2112	A3	2430	A1	2800	C3	3401	A1	5200	A4
2113	A3	2431	A1	2817	C4	3403	A1	5201	A5
2114	A3	2432	A2	2821	B1	3408	B1	5202	A5
2116	A2	2433	A2	2824	C3	3409	B1	5203	A4
2117	A2	2434	A2	2829	B1	3410	B1	5205	A4
2118	A2	2437	A2	2834	B1	3500	C1	5206	B5
2119	A2	2438	A2	2837	C3	3501	C1	5209	A4
2127	A3	2439	A1	2903	A2	3601	A5	5210	A4
2129	B3	2440	A1	2904	A2	3602	A5	5212	A4
2130	B2	2441	A2	2907	B3	3603	A5	5300	B4
2131	B2	2442	A2	2908	B2	3604	B1	5302	B4
2132	A4	2444	A1	2909	A2	3605	B1	5400	A2
2134	A4	2512	C1	2912	A1	3609	B1	5402	A1
2135	B3	2513	C1	2914	B3	3610	B2	5403	A2
2136	A3	2514	C1	3100	B3	3611	A5	5404	A2
2138	A3	2515	C2	3101	B3	3612	A5	5500	B1
2139	B3	2516	C1	3102	B3	3613	A5	5501	B1
2140	A3	2517	B1	3103	B2	3614	B2	5502	B1
2141	A3	2518	B1	3104	A4	3615	A1	5503	B2
2142	A3	2519	B2	3105	A4	3619	A1	5504	C1
2143	A3	2520	B1	3106	A3	3620	C2	5505	C1
2144	A3	2530	C2	3107	A2	3621	A5	5506	C1
2145	A3	2539	C1	3108	A3	3622	A5	5507	C1
2146	A2	2540	C1	3109	A3	3623	C1	5508	B2
2147	A4	2541	C1	3110	A3	3624	A5	5509	C2
2148	A4	2542	B2	3117	A3	3625	C1	5600	A5
2149	A4	2545	C2	3118	B1	3629	B1	5602	A5
2150	A4	2600	A5	3119	B2	3630	A1	5603	A5
2151	A4	2601	A5	3120	B3	3631	B2	5606	A1
2152	A3	2602	A5	3121	B3	3632	B1	5607	A1
2153	B2	2603	C1	3122	B3	3633	A1	5700	C4
2154	B2	2604	C1	3123	B3	3634	B2	5701	C4
2200	A4	2608	B1	3124	B3	3635	C1	5702	B3
2201	A4	2609	B1	3125	B2	3636	A1	5809	C4
2203	A4	2610	A5	3126	B3	3637	C1	5810	B3
2204	B4	2611	A5	3127	A3	3638	A1	5903	B3
2205	A4	2612	A5	3128	A3	3700	B4	5904	A1
2206	A5	2613	B1	3129	A3	3701	B3	5907	B3
2207	B4	2614	B2	3130	B3	3702	B3	7100	A3
2208	A4	2618	B1	3131	A4	3704	C4	7102	B3
2209	A5	2619	B2	3132	A4	3707	B4	7103	A4
2210	A4	2620	A5	3133	A4	3708	B4	7200	A4
2211	A5	2621	A5	3134	A4	3709	C4	7203	A4
2212	A5	2622	A5	3135	A4	3711	C4	7204	B5
2213	A4	2623	C1	3136	A3	3712	C4	7403	A2
2215	A4	2624	C1	3137	B2	3713	C5	7404	A2
2216	B4	2628	A1	3138	B2	3714	B4	7500	C2
2217	B4	2629	B1	3200	A4	3715	B5	7501	C1
2218	B5	2630	A1	3202	A3	3716	B5	7503	C2
2219	B5	2631	C1	3203	A5	3717	B5	7600	A5
2220	A5	2632	A1	3204	A4	3718	B4	7602	A1
2221	A5	2633	B2	3208	A3	3719	B4	7603	A5
2222	A4	2634	A1	3209	B5	3801	C3	7605	A5
2223	A4	2635	B2	3211	A4	3807	C3	7700	B4
2225	A4	2636	A5	3213	B4	3808	C3	7703	C5
2226	B4	2700	B4	3214	B4	3812	C3	7802	C3
2227	B4	2701	B4	3215	A4	3816	C3	7803	C3
2228	A5	2702	B4	3216	B4	3818	C3		
2230	A4	2703	C4	3217	B4	3819	C3		
2231	A3	2704	C4	3218	B4	3824	C3		
2304	B4	2705	C4	3219	A4	3825	C3		
2305	B4	2706	C4	3220	A4	3907	A3		

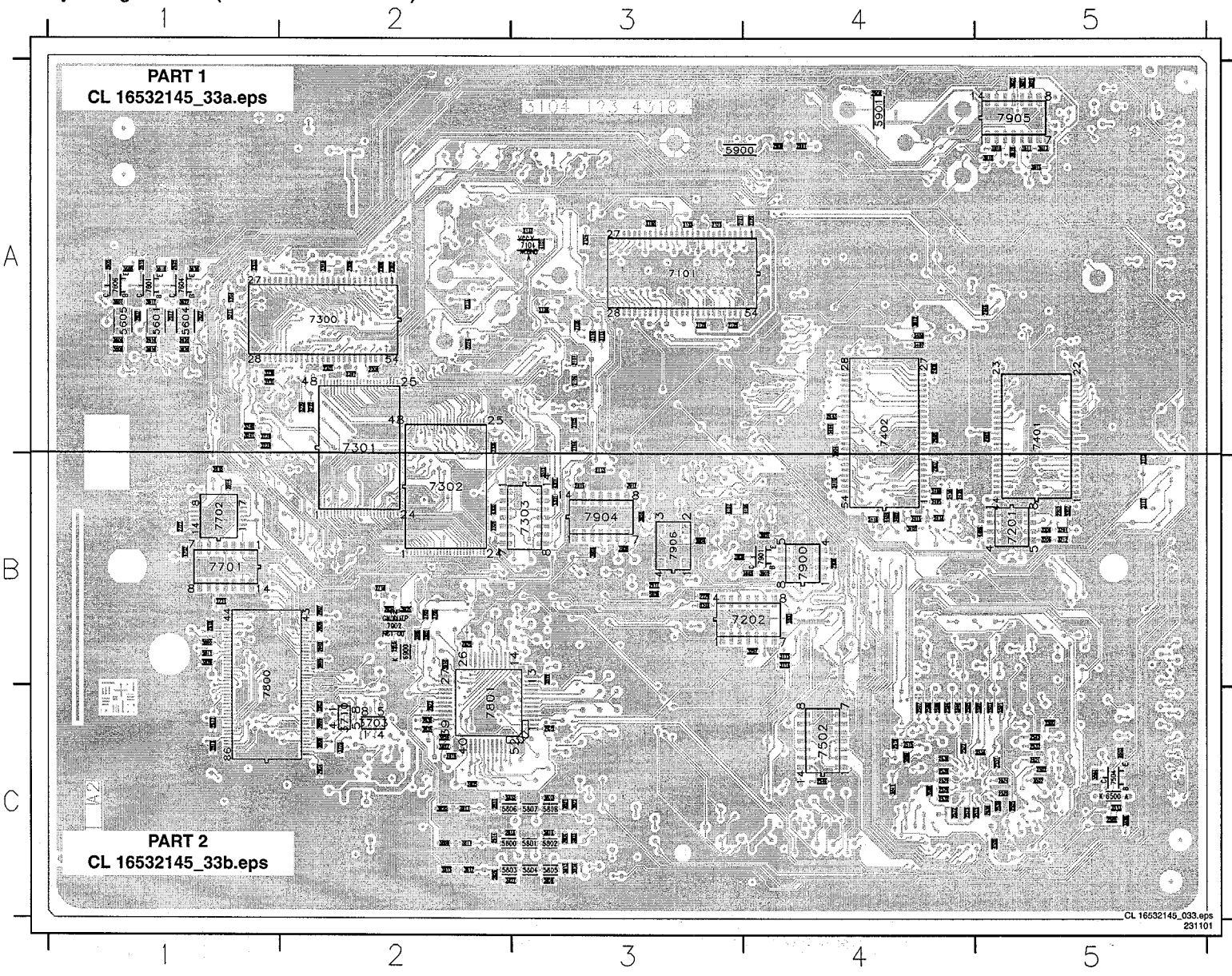
Layout Digital Board (Part 1 Top View)



Layout Digital Board (Part 2 Top View)

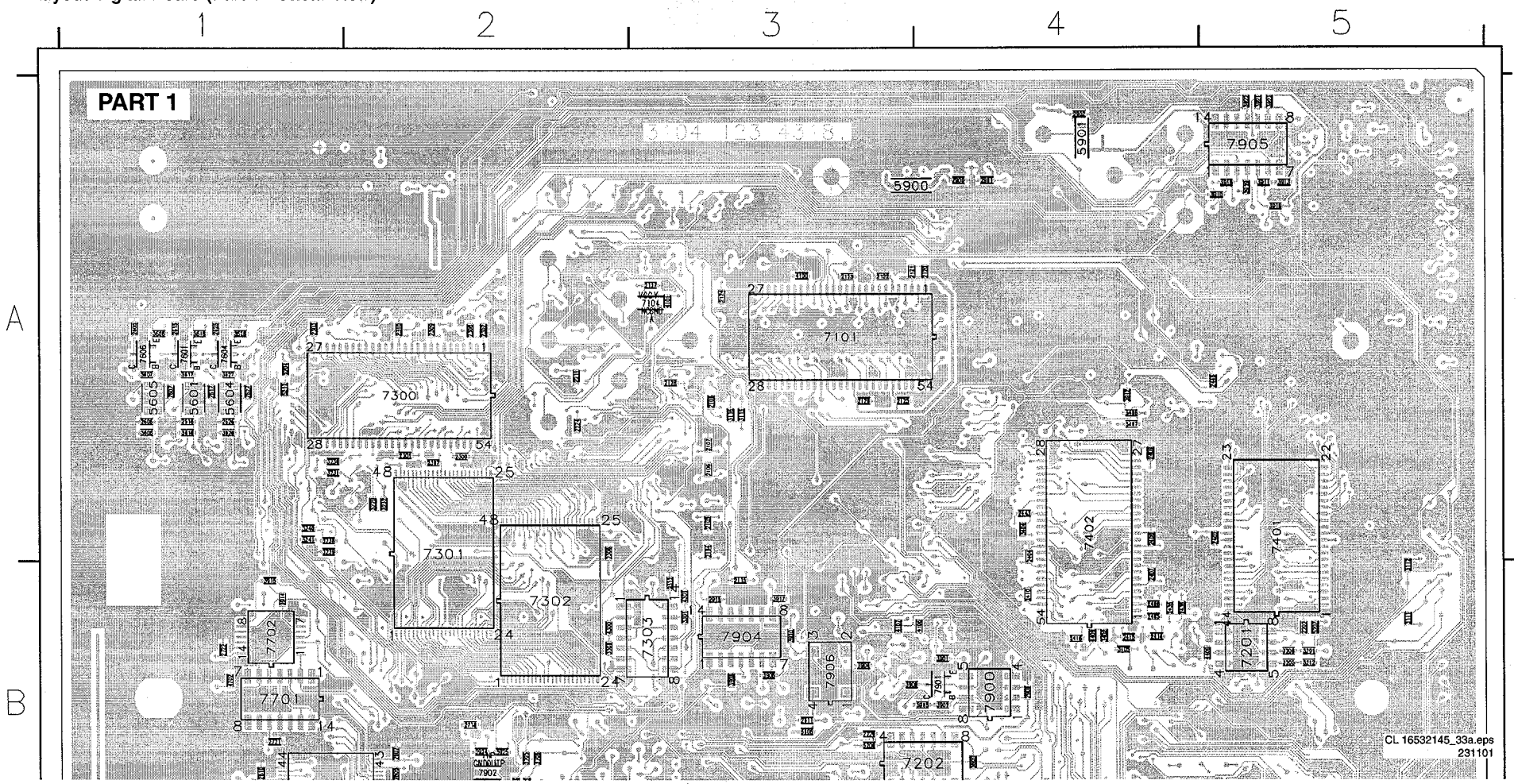


Layout Digital Board (Overview Bottom View)

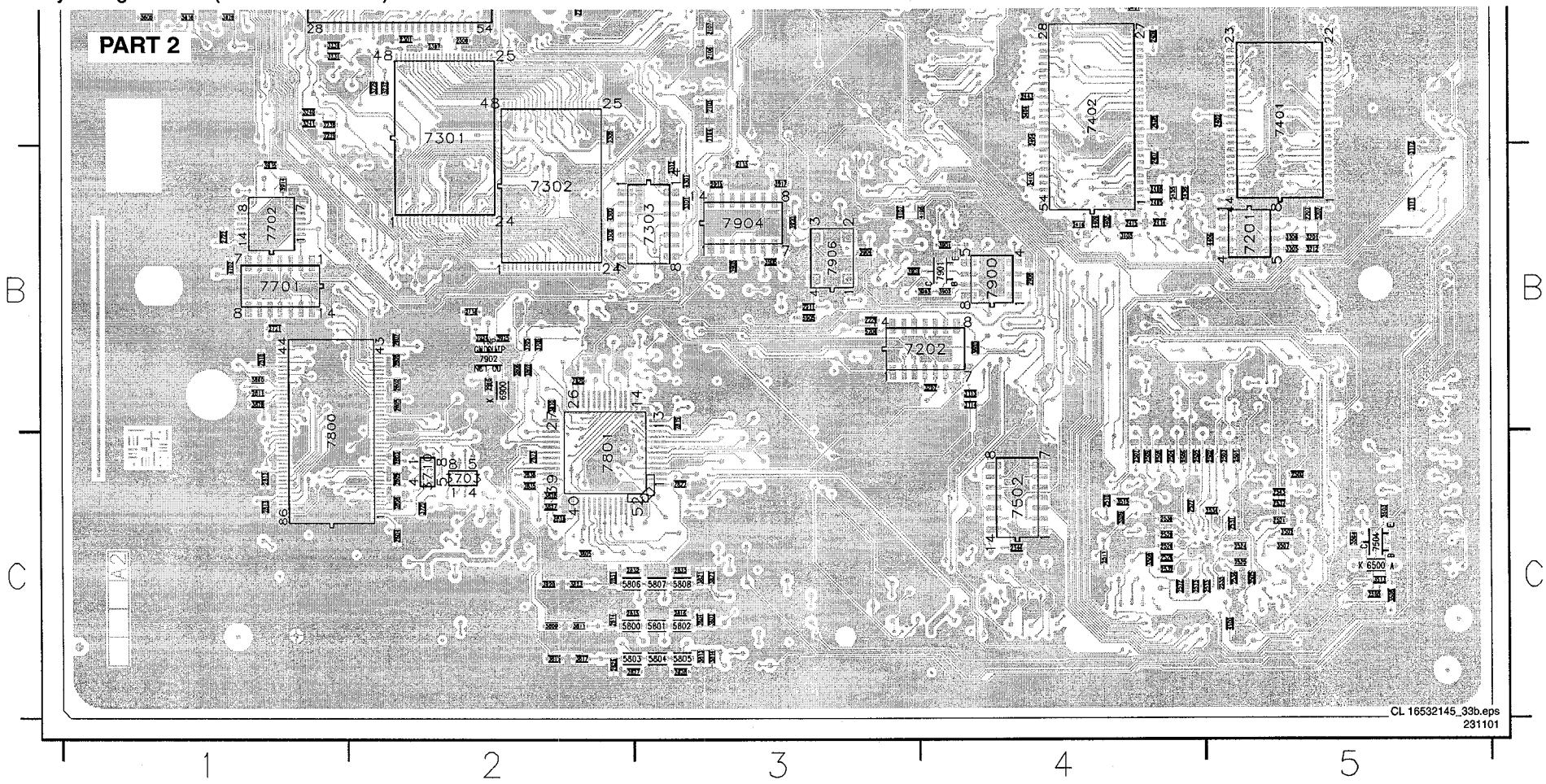


2104	A3	2802	B2	3803	C3	7702	B1
2105	A3	2803	C2	3804	C3	7800	B1
2106	A3	2804	C2	3805	C2	7801	C2
2107	A3	2805	B2	3806	B2	7900	B4
2108	A3	2806	B2	3809	C2	7901	B4
2115	B3	2807	B2	3810	B2	7902	B2
2120	A4	2808	C2	3811	C2	7904	B3
2121	A3	2809	C2	3813	C3	7905	A5
2122	A3	2810	B1	3814	C3	7906	B3
2123	A3	2811	B1	3815	C2		
2124	A3	2812	C1	3817	C2		
2125	A3	2813	C1	3820	C2		
2126	A3	2814	C2	3821	C3		
2128	A3	2815	C2	3822	C3		
2137	A3	2816	C3	3823	C2		
2202	B5	2818	C2	3826	C2		
2214	A2	2819	B3	3827	C2		
2224	A2	2820	B2	3828	B1		
2229	B3	2822	C3	3900	B3		
2300	A2	2823	C2	3901	B4		
2301	A2	2826	C2	3902	B4		
2302	A2	2827	C2	3903	B4		
2303	A1	2828	C3	3904	B3		
2306	A2	2831	C2	3906	B3		
2307	A2	2832	C2	3908	B3		
2308	A2	2833	C3	3910	A5		
2309	A2	2835	C2	3911	A5		
2310	A2	2836	C2	3912	A4		
2312	B3	2900	A4	3913	A5		
2402	A5	2901	A4	3914	B1		
2404	A4	2902	A4	3915	B1		
2405	B4	2906	B4	3916	A5		
2406	B4	2911	B3	3917	B3		
2407	B4	2915	B3	3918	A5		
2408	A4	2916	B2	3919	A5		
2409	A4	3111	B5	3920	B3		
2410	B4	3112	B5	3921	A5		
2414	B4	3113	B4	3922	A5		
2415	B4	3114	B4	3923	A5		
2416	B4	3115	A3	3924	B2		
2435	B4	3116	A3	3925	B2		
2436	B4	3201	B5	4100	A3		
2443	A4	3205	B5	4101	A3		
2446	A5	3206	B5	4106	B4		
2500	C5	3207	B4	4107	B3		
2501	C5	3212	B5	4300	B2		
2502	C5	3229	A2	4301	B3		
2503	C5	3230	A1	4406	B5		
2504	C4	3231	A1	4409	B4		
2505	C4	3232	A2	4500	C5		
2506	C4	3238	A1	4702	B1		
2507	C4	3239	A1	5204	A1		
2508	C4	3240	A1	5207	B5		
2509	C4	3241	A1	5208	B3		
2510	C4	3300	B2	5211	A1		
2511	C4	3301	B3	5601	A1		
2521	C5	3402	B4	5604	A1		
2522	C4	3404	A4	5605	A1		
2523	C4	3405	B4	5800	C2		
2524	C5	3406	A4	5801	C3		
2525	C5	3407	A4	5802	C3		
2526	C4	3502	C5	5803	C2		
2527	C4	3503	C5	5804	C3		
2528	C4	3504	C5	5805	C3		
2529	C4	3505	C5	5806	C2		
2531	C5	3506	C5	5807	C3		
2532	C4	3507	C5	5808	C3		
2533	C5	3508	C4	5900	A3		
2534	C5	3509	C4	5901	A4		
2535	C5	3513	C5	5905	B3		
2536	C5	3515	C4	6500	C5		
2537	C5	3600	B4	6900	B2		
2538	C4	3606	A1	7101	A3		
2543	C5	3607	A1	7104	A3		
2544	C4	3608	A1	7201	B5		
2565	C5	3616	A1	7202	B4		
2605	A1	3617	A1	7300	A2		
2606	A1	3618	A1	7301	A2		
2607	A1	3626	A1	7302	B2		
2615	A1	3627	A1	7303	B3		
2616	A1	3628	A1	7401	A5		
2617	A1	3703	C2	7402	A4		
2625	A1	3705	B2	7502	C4		
2626	A1	3706	B2	7504	C5		
2627	A1	3710	C2	7601	A1		
2718	B2	3720	C2	7604	A1		
2721	B1	3800	B1	7606	A1		
2722	B1	3802	B2	7701	B1		

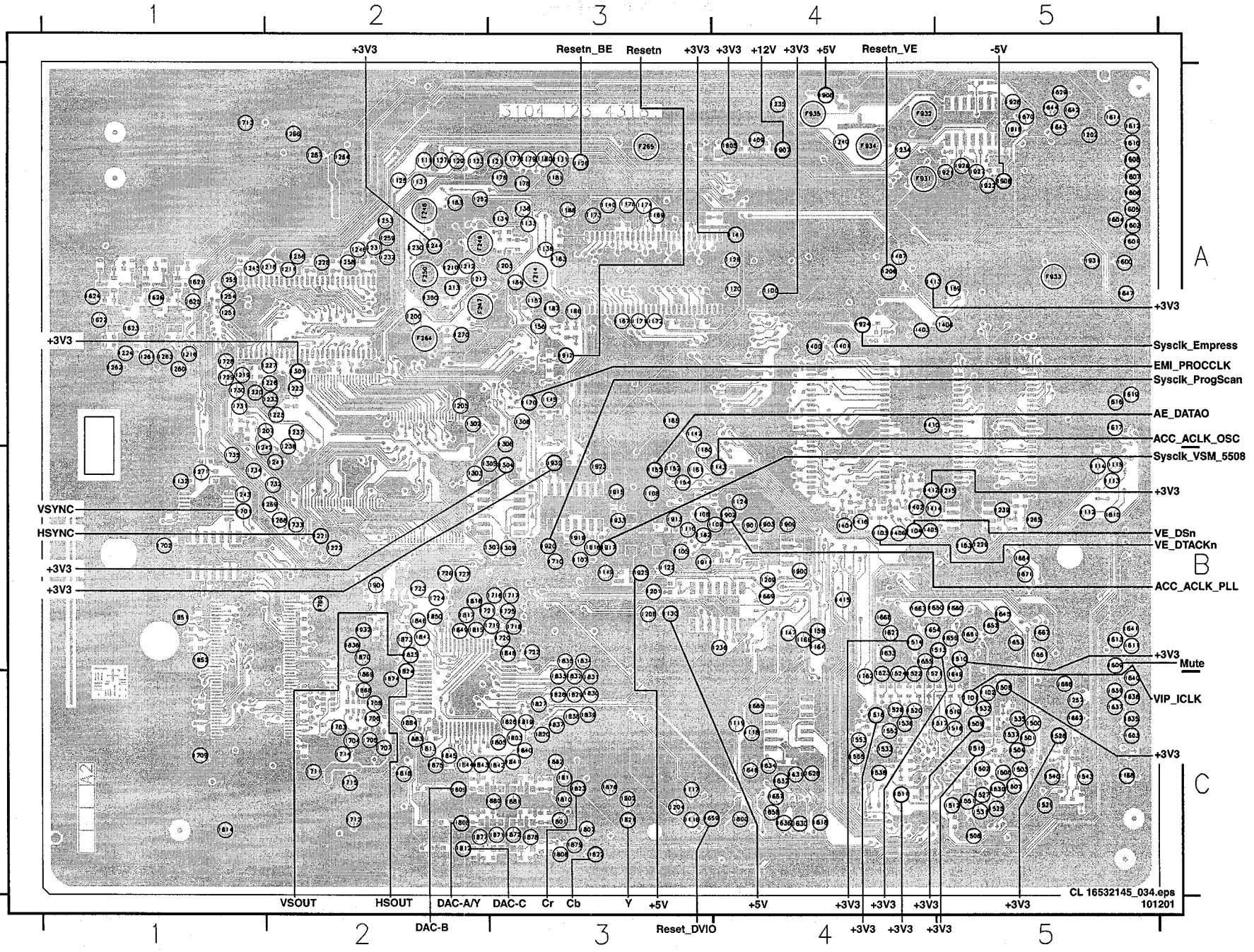
Layout Digital Board (Part 1 Bottom View)



Layout Digital Board (Part 2 Bottom View)



Layout Digital Board (Testlands Bottom View)



Layout Digital Board (Mapping Testlands)

F214	A3	I175	A3	I300	A2	I610	A5	I720	B3	I880	C3				
F247	A2	I176	A3	I301	A2	I611	B5	I721	B2	I881	C3				
F248	A2	I177	A3	I302	A2	I612	A5	I722	B3	I882	C3				
F249	A2	I178	A3	I303	B2	I613	B5	I723	B2	I883	C2				
F250	A2	I179	A3	I304	B3	I614	A5	I724	B2	I884	C2				
F264	A2	I180	A3	I305	B3	I615	B5	I725	B3	I900	B4				
F265	A3	I181	A3	I306	A3	I616	A5	I726	B2	I901	B4				
F931	A4	I182	B3	I307	B3	I617	A5	I727	B2	I902	B4				
F932	A4	I183	A2	I308	A3	I618	C4	I728	A1	I903	B4				
F933	A5	I184	A3	I309	B3	I619	A5	I729	A1	I904	B2				
F934	A4	I186	A3	I400	A4	I621	A1	I730	A1	I905	A4				
F935	A4	I187	A3	I401	A4	I622	A1	I731	A1	I906	A4				
I100	A4	I188	A3	I402	B4	I623	A1	I732	B2	I907	A4				
I101	C5	I200	A2	I403	A4	I624	A1	I733	B2	I908	A5				
I102	C5	I201	B3	I404	B4	I625	A1	I734	B1	I909	B4				
I103	B4	I202	A5	I405	B4	I626	A1	I735	B1	I911	B3				
I104	B4	I203	A3	I406	B4	I627	B4	I800	C4	I912	A3				
I105	B3	I204	C3	I407	A4	I628	C4	I801	C3	I913	B3				
I106	B3	I205	A2	I408	A5	I629	A5	I802	C3	I915	B3				
I107	B3	I206	A4	I409	A4	I630	C4	I803	C3	I916	B3				
I108	B3	I207	A2	I410	A4	I631	C4	I805	C3	I917	B3				
I109	B4	I208	B3	I412	B4	I632	C4	I806	C3	I918	A5				
I110	B3	I209	B4	I413	A4	I633	B4	I807	C3	I919	B3				
I111	A2	I210	A2	I414	B4	I634	C4	I808	C2	I920	B3				
I112	B5	I211	A2	I415	B4	I635	C5	I809	C2	I921	A5				
I113	B5	I212	A2	I416	B4	I636	C4	I810	C3	I922	A5				
I114	B5	I213	A2	I500	C5	I637	C5	I811	C3	I923	B3				
I115	B5	I215	B5	I501	C5	I638	C5	I812	C2	I924	A4				
I116	C3	I216	A1	I502	C5	I639	C5	I813	C2	I925	B3				
I117	C3	I217	A2	I503	C5	I640	C5	I814	C1	I926	A5				
I118	C4	I218	A2	I504	C5	I641	B5	I815	B2	I927	A5				
I119	C4	I219	A1	I505	C5	I642	A5	I816	B2	I928	A5				
I120	A4	I220	A1	I506	C5	I643	A5	I817	B2	I930	B3				
I121	A3	I221	B2	I507	C5	I644	A5	I818	C2	I931	A5				
I122	B3	I222	B2	I508	C5	I645	B5	I819	C3	I932	B2				
I123	A2	I223	A2	I509	C5	I646	C4	I820	C3	I933	B3				
I124	B4	I224	A1	I510	B5	I647	A5	I821	C3						
I125	A2	I225	A2	I511	C4	I649	C5	I822	C3						
I126	A3	I226	A2	I512	C5	I650	B4	I823	C3						
I127	A2	I227	A2	I513	B5	I651	B5	I824	B2						
I128	A4	I228	A2	I514	B4	I652	B5	I825	B2						
I129	A2	I229	B5	I515	C5	I653	B5	I826	C3						
I130	B3	I230	A2	I516	C5	I654	B4	I827	C3						
I131	A3	I231	A2	I517	C5	I655	B4	I828	C3						
I132	B1	I232	A2	I518	C4	I656	B5	I829	C3						
I133	A3	I233	A2	I519	C5	I657	C4	I830	C3						
I134	A3	I234	A4	I520	C4	I658	C4	I831	C3						
I136	A3	I235	A4	I521	C4	I659	C3	I832	C3						
I137	A2	I236	B4	I522	C4	I660	B5	I833	C3						
I138	A3	I237	A2	I523	C4	I661	B5	I834	B3						
I140	A3	I238	A2	I524	C4	I662	C5	I835	B3						
I141	A4	I239	B5	I525	C5	I663	B4	I836	B2						
I142	A3	I240	A4	I526	C5	I664	B5	I837	C3						
I143	B4	I241	B2	I527	C5	I665	C4	I838	C3						
I145	A3	I242	B1	I528	C4	I666	C5	I839	C3						
I147	B4	I243	B1	I529	C5	I667	B5	I840	C3						
I149	B3	I244	A2	I530	C5	I668	B4	I841	C3						
I152	B3	I245	A1	I531	C5	I669	B4	I842	C3						
I153	B5	I246	A2	I532	C5	I670	A5	I843	C2						
I154	B3	I251	A1	I533	C4	I671	B5	I844	C2						
I155	B3	I252	A2	I535	C5	I700	B2	I845	C2						
I156	A3	I253	A2	I536	C4	I701	B1	I846	B3						
I157	A3	I254	A1	I537	C5	I702	B1	I847	B2						
I158	B4	I255	A1	I538	C4	I703	C2	I848	B2						
I159	A5	I256	A2	I540	C5	I704	C2	I849	B2						
I160	B3	I257	C5	I543	C5	I705	C2	I850	B2						
I161	B3	I258	A2	I551	C5	I706	C2	I851	B1						
I162	C4	I259	A2	I552	C4	I707	C2	I852	B1						
I163	A3	I260	A1	I553	C4	I708	C2	I868	C2						
I164	B4	I261	A1	I555	C4	I709	C1	I869	C2						
I165	A3	I262	A1	I600	A5	I710	B3	I870	B2						
I166	B4	I263	A1	I601	A5	I711	C2	I871	C3						
I167	A3	I264	A2	I602	A5	I712	C2	I872	C3						
I168	C5	I265	B5	I603	C5	I713	A1	I873	B2						
I169	A3	I266	A2	I604	A5	I714	C2	I874	C2						
I170	A3	I267	A2	I605	A5	I715	C2	I875	C2						
I171	A3	I268	B2	I606	A5	I716	B3	I876	C3						
I172	A3	I269	B2	I607	A5	I717	B3	I877	C2						
I173	A3	I270	A2	I608	A5	I718	B3	I878	C3						
I174	A3	I271	B1	I609	B5	I719	B3	I879	C3						

CL 16532145-34m.eps
101201

Personal Notes:

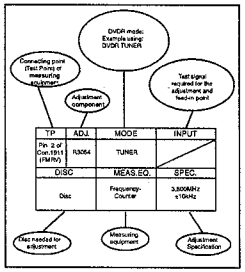
8. Alignments

8.1 Alignment Instructions Analogue Board

Test equipment:

1. Dual-trace oscilloscope
   Voltage range : 0.001 - 50 V/div
   Frequency : DC - 50 MHz
   Probe : 10:1, 1:1
2. DVM (Digital voltmeter)
3. Frequency counter
4. Sinus generator
   Sinus : 0 - 50 MHz
5. Test pattern generator

How to read the adjustment procedures:



Front End (FV)

Service tasks after replacement of IC 7710, coil L5710 and L5711:

1 AFC Adjustment:

Purpose: Correct adjustment of demodulator AFC - circuit
Symptom, if incorrectly set:
Bad or disturbed TV channel reception.

PAL - AFC adjustment [5711]:

TP	ADJ.	MODE	INPUT
IC 7710 Pin 17 (F708)	L5711	TUNER	38,9MHz 500mV$_{pp}$ at Tuner 1705, Pin 11 (F710, IF-out)
DISC		MEAS.EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,1V

Storage in NVRAM via command mode interface of DSW:
After adjustment, the AFC reference value has to be stored in the NVRAM.
This reference value is 256 * measured voltage/Ucc. Ucc is 5.0V.
Store the reference value via command 732 , followed by the ref. value.
Example: DD:> 732 128

2 HF - AGC adjustment [3724]:

Service tasks after replacement of IC 7710:

Purpose: Set amplifier control.

Symptom, if incorrectly set:
Picture jitter if input level is too low and picture distortion if input level is too high.

TP	ADJ.	MODE	INPUT
Tuner 1705 Pin 11 (F710, IF-out)	R3707	Set tuned to channel 25 503.25 MHz	5mV(74dBµV) on aerial input PAL white picture, audio IF on, no modulation
DISC		MEAS.EQ.	SPEC.
		Oscilloscope Video Pattern Generator	500mV$_{pp}$ +/-0.5dB (use a 10:1 probe)

3 Attenuating the 40.4 MHz [5710]: (SECAM only)

Service tasks after replacement of coil 5710:

Purpose: To attenuate the band I carrier rests.

Symptom, if incorrectly set:
Bad picture quality when the filter attenuates the picture carrier (38.9MHz).

TP	ADJ.	MODE	INPUT
OFW 1701 Pin 1 (F709)	L5710	TUNER	40.4 MHz, 200mV$_{pp}$ at Tuner 1705, Pin 11 (F710, IF-out)
DISC		MEAS.EQ.	SPEC.
		Oscilloscope, Sinus Generator, Counter	adjust minimum amplitude

If the adjustment is correct the signal at pin 1 of OFW [1701] must be smaller than the input signal amplitude by at least 6 dB.

Figure 8-1

8.2 Reprogramming Procedure of NVM on the Microprocessor Sub PCB

The NVM, item 7808, on the Microprocessor Sub board contains the following factory settings:
1. Clock correction factor
2. AFC reference value
3. Slash version

The settings 1,2 and 3 are stored in the NVM during the production of the analogue board.
The slash version is stored at the end of the production line of the set.
In case of failure, the NVM must be replaced by an empty device. By way of commands via the Diagnostic Software or via ComPair, the factory settings must be restored in the NVM.

8.2.1 Clock Correction Adjustment

To guarantee an exact function of the real time clock, an adjustment of the clock frequency is possibe. The adjustment value is stored in the NVM.
Procedure:
- put the set in service command mode
- execute command 722 to initiate that a signal with 32768 Hz is available on pin 3 of connector 1988
  DD:>722
- measure the frequency f_{meas} of the Clock Crystal with an accuracy of ± 0.1 Hz.
- Calculate the parameter to be entered: $32768/f_{meas} * 10^6$
- Normally the parameter must be between 999902 and 1000097. If the parameter and therefore the frequency of the crystal is outside this range, the crystal must be replaced.
- Execute command 721 with the parameter as input
  example:
  DD:>721 1000023

8.2.2 AFC Reference Voltage Tuner

This function stores the reference voltage for the tuner in the NVM. Before this value can be stored, the AFC adjustment, described in the adjustment instructions of the analogue board, must be carried out.
Procedure:
- Adjust AFC circuit
- Calculate the reference value
- Execute command 732 and use the calculated reference value as parameter
  example:
  DD:>732 128

8.2.3 Slash Version

The slash version is stored with command 715 followed by the slash version as parameter.
The slash versions used in DVDR880 and DVDR890 are the following:
- DVDR880/00X: 63
- DVDR880/02X: 63
- DVDR880/05X: 64
- DVDR890/00X: 61
- DVDR890/02X: 61
- DVDR890/05X: 62
- DVDR890/69X: 81
- DVDR890/17X: 61

Example:
DD:>715 63

Reset of Slash Version
Use command 729 to reset the analogue board to the default setting.
Procedure:
- Put the set in DSW command mode
- Execute command 729 with the following parameters:
  DD:> 729 w 0xA0 3 0x07 0xD0 0x00
- Leave the DSW command mode and start up the set in application mode
  No background is visible on the TV screen. The analogue board is ready to accept the appropriate slash version

8.3 Rework Procedure IEEE Unique Number

8.3.1 Scope:

The procedure describes how to upgrade sets with a unique number after repair. This unique number is stored in the NVRAM (item 7201) of the digital board at the end of the production line.
This procedure is only valid or necessary when:
- The digital board is replaced
- NVRAM on the digital board is replaced
- NVRAM is cleared

In all other cases the repaired set retains its unique number.
The procedure defines several means to re-assure the unique number depending on the possibilities of repair or the state the faulty set is in.

8.3.2 Handling:

State of original (defective) board:
1. The digital board starts up in Diagnostics Mode: follow procedure A to retrieve the valid unique number
2. The digital board does NOT start up in Diagnostics Mode: follow procedure B.

8.3.3 Procedure A

1. Connect defective digital board to PC via serial cable (3122 785 90017)
2. start up hyper terminal or any other serial terminal via the correct settings (DSW command mode interface)
3. read out existing unique number via nucleus 403
   example:
   DD:> 403
   40300: DV Unique ID = 00D7A1FC6C
   Test OK ☻
4. note read out
5. program new digital board via nucleus 410
   example: DD:> 410 00D7A1FC6C
   41000:
   Test OK ☻

The set has now the original unique number

8.3.4 Procedure B

1. Note the serial number of the set
   example:
   VN050136130156
   - VN = production centre (VN....Szekesfehervar). According to UAW-500: V=22 and N=14
   - 05 = change code (this is not used for this calculation)
   - 01 = YEAR
   - 36 = Production WEEK
   - 130156 = Lot and SERIAL number
2. Calculate the unique number: this number always exists out of 10 hexadecimal numbers.
3. First 5 numbers:
   First we calculate a decimal number according to the formula below:
   35828*YEAR* **+ 676*** *WEEK* **+ 26*V + N + 8788**
   The figures are fixed, *YEAR + WEEK + factory code (V + N) are variable*
   Example:
   35828*01+676*36+26*22+14+8788 = 69538 (decimal)
   Then we translate the decimal number to a hexadecimal number.
   example:
   69538 (decimal) = 10FA2 (hex)
4. Last 5 numbers:
   The last 5 numbers exist out of the Lot and SERIAL number.
   We have to translate the decimal number to the next 5 hexadecimal numbers:
   Example:
   130156 (decimal) = 1FC6C (hex)
5. Program new digital board via nucleus 410
   Therefore we use the 10 hexadecimal numbers we calculated above:
   example:
   DD:> 410 10D7A1FC6C
   41000:
   Test OK ☺

The set has now its original unique number

9. Circuit-, IC Descriptions and List of Abbreviations

9.1 Display Board

9.1.1 Microcontroller

The core element of the Display Control unit is the microcontroller TMP87CH74AF [7110]. The TMP87CH74AF is an 8 bit microcontroller fitted with 32kB ROM and 1kB RAM. It requires 5V supply and is responsible for the following functions:

- Interface to Central Controller-µP
- Evaluation of the keyboard matrix
- Decoding the remote control commands from the infra-red receiver
- Activation and control of the local display
- Heater voltage generation

The 8 MHz resonator (Pos. 1111) generates the system clock. The reset is generated by the CC-µP via "POR_DC"-signal where the transistor [7106] is used as a level-shifter from 3V3 to 5V.

9.1.2 Interface to the Central Control µP

The communication to the main microcontroller (CC) on the µP-Sub-PCB is done via I^2C-Interface, where the TMP87CH74AF acts in slave-mode.
An additional wire ("INT"-line) is used to signal the Central controller that data are ready, e.g. when a key has been pressed.

9.1.3 Evaluation of the Keyboard Matrix

There are 10 different keys on the display board. A resistor network is used to generate a specific direct voltage value, depending on the pressed key. Via the resistors 3168 and 3169 on the analog/digital (A/D) ports (7110 pin 37 and 38) the evaluation is done.

9.1.4 IR Receiver and Signal Evaluation

The IR receiver [7150] contains a selectively controlled amplifier as well as a photo-diode. The photo-diode changes the received infra red transmission (approx. 940nm) to electrical pulses, which are then amplified and demodulated. On the output of the IR receiver [7150], a pulse sequence with TTL-level, which corresponds to the envelope curve of the received IR remote control command, can be measured. This pulse sequence is fed into the controller for further processing via port TC1 [7110, pin20].

9.1.5 Vacuum Fluorescence Display

The VFD "10-BT-242GNK" [POS 7100] is fully controlled by the microcontroller. The µC also includes the driving stages. Only two additional drivers [POS 7101 and 7102] are necessary for the grids 8 and 10 because of their large size.

9.1.6 VFD Heater Voltage Generator

The circuit around POS [7103, 7104 and 7105] is used to generate a proper AC-Voltage for the filament of the VFD. For this the microcontroller generates an appropriate rectangular signal with 50% duty-cycle and a frequency of 30 kHz at pin 19. Pos. [5193] and [2102] are acting as a resonance-circuit. Via Zener-Diode (POS[5100]) and resistors [3100, 3103 and 3104] the two heater-pins of the VFD ("FIL1" and "FIL2") are clamped so that the grids and segments can be fully switched off.

9.1.7 REC-LED

The REC-LED is a red LED, located on a small PCB together with the REC-Switch and controlled via pin 3 of the microcontroller. The POS [7180] is used as a driver for the led.

9.2 Microcontroller Sub Board (UPC12 SUB PCB)

9.2.1 General

This small PCB is directly soldered in on top of the Analogue-Board.
It is used with no diversity in all three different basic versions (Europe, NAFTA and APAC-Pal). Only the software being loaded into the external Flash-memory is not the same.

9.2.2 Microcontroller

The main part of the Sub-PCB is the central controller (CC) µP [7804] TMP91CW12AF, which is a 16-bit CPU with 128kBROM and 4kB RAM.
It works with a 3V3 supply and a system clock of 24,576MHz [1801].
The 3V3-supply is made out of the "5VSTBY" by the circuit around [7816].
After connecting the set to the mains (power-up) the IC [7806] generates a reset pulse. This signal ("IPOR") is directly fed to first priority interrupt input (pin 63) for power fail detection and also to the Reset-Input of the CC (Pin30) via [7802], which is necessary to generate a reset only during power-up. In case of power fail pin 30 of the CC must be kept high (3V3).
The internal memory of the CC is too small for all necessary demands. Therefore an external Flash-ROM [7805] with 1MByte in size and a RAM [7803] with 128kByte are necessary. Both parts are connected to the µP via a parallel address-/data-bus. The lower eight bus-lines (AD0 to AD7) are multiplexed by [7801] and the "ALE"-signal of the CC.
For updating of the software the external Flash-ROM can be reprogrammed by the µP. During this process [7807] is switched on by the "WE"-signal.
When no mains is connected, the CC is supplied via Gold-Cap [2816] during the power backup period. The diode [6802] prevents unwanted current consumption of other components.
The internal ROM of the µP holds the program code for the Real-Time-Clock. Only the microprocessor is supplied by the backup cell, not the external memories and the µP operates in a low frequency mode with the clock crystal [1805] only (32.768 kHz). To adjust the clock the frequency can be measured at pin 87 of the µP in a special test-mode.

9.2.3 Control-Interfaces

The CC is communicating with the digital board via a serial connection, which operates at a speed of 19,4 kbit/s ("D_DATA-", "A_DATA", "D_RDY"- and "A_RDY"-signal on [1986]). By generating a high level on pin 16 of the CC the digital PCB can be reset (inverter [7817] in between).
Most of the other parts are controlled by the µP via I^2C-bus ("SDA"- and "SCL"-signal). The FETs [7821] and [7822] are used for adaptation of the 3V3-level on CC-side to the components supplied with 5V.
The CC can also reset the display-board-µP by pulling pin 39 to high.
The transistor [7819] acts as a level shifter for the "INT"-signal. In the European sets a bi-directional interface is established between the recording unit and the TV device at pin 10 of the Scart ("P50"-line/Easy Link). The processing is done via pin 14 (output) and pin 38 (input) of the CC and the circuit around [7813], [7814] and [7815].

9.2.4 EEPROM

The EEPROM M24C16 [7808] is an electrical erasable and programmable, non-volatile memory. The EEPROM stores data specific to the device, such as the AFC-reference value of the Europe IF-part, the clock-correction-factor, etc. It is accessed by the µP via the I²C-bus.

9.2.5 Sync Separator

TTo detect whether a video signal is available or not a separate IC [7825] is used to extract the sync information out of the video signal that is also routed to the digital board for recording.
While on the input a low-pass-filter ([2823] and [3869]) limits the bandwidth an additional filter (circuit around [7818]) on the output avoids distortions. Afterwards the sync-signal is routed to pin11 of the CC.

9.2.6 Fan Control

To avoid unwanted temperatures inside the set (especially the Laser on the OPU of the drive is very sensitive) a fan is located on top of the basic engine. The speed control is dependent on the ambient temp. A NTC resistor [3172] located on the display board measures the temperature. An operational amplifier [7902-B] generates a proper voltage, which is then fed to the engine ("BE_FAN"-line). Below 28°C ambient temp. the fan-voltage is approx. 5V and is increased to 10V when the ambient temperature goes up to approx. 35°C. The second part of the Op-Amp. [7902-A] prevents damage of any temperature-sensitive part in case the NTC or the wire in between is damaged. It acts as a comparator and pulls the "BE_FAN"-signal to 10V. As the fan has to be stopped in case the tray of the drive is open this voltage is "killed" by the CC ("FAN_OFF"-signal). The double-diode [6903] acts for both Op.-Amp.-circuits.

9.2.7 Power Supply

The 5SW and 8SW supply are switched off in case of standby from the P via the ISTBY-line. This is possible for power-save. The ISTBY-line must be low in case of STBY. There is also a „power fail" circuit on the PS-schematic which is necessary to mute AUDIO when IPFAIL is low.

9.3 Analog Board Europe

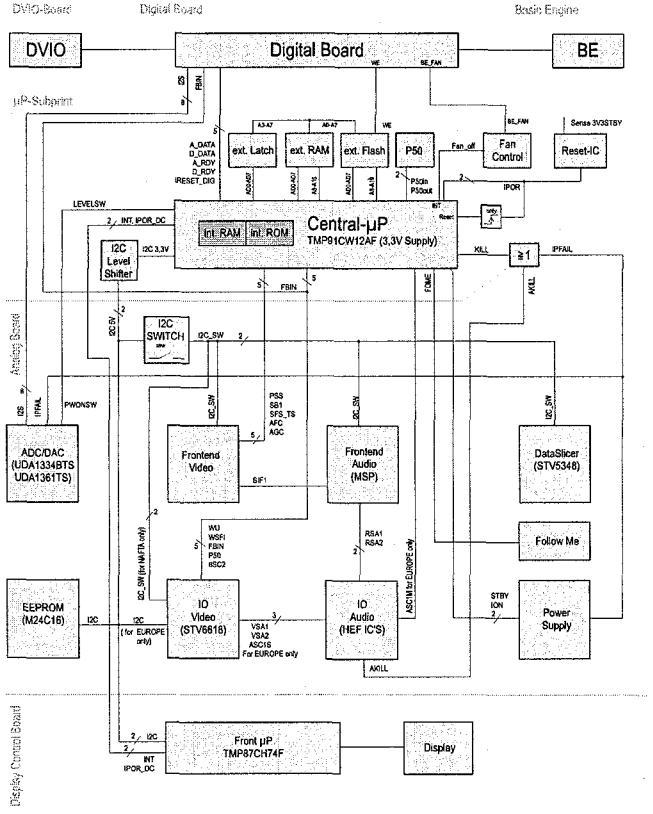
9.3.1 General

This PCB consists out of the following parts:

- Power-Supply-Unit
- Frontend (Audio & Video)
- Input/Output-switching
- Audio ADC- & DAC-processing
- VPS/PDC- and Text-Data slicer
- Analog Follow-Me Circuit

All functional groups are either controlled via I²C-bus or via separate signal lines by the Central-Controller on the µP-Sub-Board. This sub board is directly soldered in onto the analog PCB. During Stand-By mode of the set, several parts are not supplied (Tuner, MSP, ...). The microprocessor is running and maintains the clock of the set.
To avoid bus blockades the I²C-bus ("SCLSW" & "SDASW") to/from these units is decoupled via transistors [7419], [7420] from the general bus ("SCL" & "SDA").

Blockdiagram Control Lines and Bus Systems



9.3.2 Power Supply Unit

Functional Principle:
This power supply works in the way of a flyback converter. In the mains input part [1931 to 2309], the mains voltage is rectified and buffered in the capacitor [2309]. From this direct voltage at [2309] energy is transferred into the transformer [5300, pins 7-5] during the conductive phase of the switching transistor [7307] and is stored there as magnetic energy. This energy is passed to the secondary outputs of the power supply in the blocking phase of the switching transistor [7307]. With the switch-on time of the switching transistor [7307], the energy transferred in every cycle is regulated in such a way that the output voltages remain constant regardless of changes in the load or mains voltage. The power transistor is driven by the integrated circuit [7313].

Mains input part:
The mains input part extends from the mains socket [1931] to the capacitor [2309]. The diodes [6301, 6302, 6305 and 6306] rectify the AC supply voltage, which is then buffered by the capacitor [2309]. The common mode coil [5302] and capacitor [2302] work as a filter to block interference arising in the power supply from the mains. Components [1302], [3306] protect the power supply against short-term over voltages in the mains, e.g. caused by indirect lightning.

Start-up with Mains-on:
After connecting the power cord to the mains, the capacitor [2325] is loaded via a current source between pin 8 and pin 1 in the IC [7313]. Once the voltage on [2325] and therefore the supply voltage V_{cc} of the IC [7313] has reached approx. 11V, the IC starts up and provides pulses at its output pin 5. These pulses are used to drive the gate of the power transistor [7307]. The frequency of these pulses is depending on load and mains voltage. The current consumption of the IC is approx. 5 mA at V_{cc} in normal mode.
If V_{cc} drops to below approx. 9V (e.g. with power limitation) or if V_{cc} exceeds approximately 16V (e.g. interruption of the control loop), the output of the IC [7313, pin 5] is blocked and a new start-up cycle begins. (See also "Overload, Power Limitation, Burst Mode" section)

Normal operation:
With increasing load on one or more of the power supply outputs, the switch-on time for the power transistor [7307] increases, and thus also the peak value of the delta-shaped current through this power transistor. The equivalent voltage of this current profile is passed from resistors [3321] and [3352] via [3365] to pin 5 of the IC [7313]. If the voltage on pin 2 reaches approx. 0.4V in one switching cycle, the conductive phase of the switching transistor is ended immediately. The check is done in each individual switching cycle. This process ensures that no more than approx. 50W can be taken out from the mains (= **power limitation**).
If the power supply reaches the power limit, the output voltages and the supply voltage V_{cc} on pin 1 of the IC [7313] will be reduced following further loading. If V_{cc} is less than approx. 9V at any point during this process, the output of the IC [7313, pin 6] is blocked. All output voltages and V_{cc} decrease and a new start-up cycle begins. If the overload status or short-circuit remains, the power limitation will be activated immediately and the voltages will again decrease, followed by another start-up cycle (**Burst Mode**). The amount of power taken up from the mains in burst mode is low.

Overload, power limitation, burst mode
With the power supply in normal mode, the periodic sequences in the circuit are divided primarily into the conductive and blocking phase of the switching transistor [7307]. During the **conductive phase** of the switching transistor [7307], current flows from the rectified mains voltage at capacitor [2309] through the primary coil of the transformer [5300, pins 7-5], the transistor [7307] and resistors [3321, 3352] to ground. The positive voltage on pin 7 of the transformer [5300] can be assumed as constant for a switching cycle. The current in the primary coil of the transformer [5300] increases linearly. A magnetic field representing a certain value of the primary current is formed inside the transformer. In this phase, the voltages on the secondary coils are polarized such that the diodes [6300, 6303, 6307, 6308, 6310, 6313, 6317 and 6319] block. From the controller [7315] a current is supplied into the CTRL input on the IC [pin 3, 7313] via optocoupler [7314]. Once the switch on time of the switching transistor [7307] - that corresponds to the current supplied into the CTRL input - has been reached, the switching transistor [7307] is switched off.
When the switching transistor has been switched off, the **blocking phase** begins. No more energy will be transferred into the transformer. The inductivity of the transformer will still attempt to keep the current flowing at a constant level (U=L*di/dt). Switching off transistor [7307] interrupts the primary current circuit. The polarity of the voltages on the transformer is reversed, which means that the diodes [6300, 6303, 6307, 6308, 6310, 6313, 6317 and 6319] become conductive and current flows into the capacitors [2305, 2312, 2319, 2322, 2326 and 2328] and the load. This current is also ramp-shaped (di/dt negative, therefore decreasing).
The **feedback control** for the switched-mode power supply is done by changing the conductive phase of the switching transistor so that either more or less energy is transferred from the rectified mains voltage at [2309] into the transformer. The regulation information is provided by voltage reference [7315]. This **element** compares the 5V-output voltage via voltage divider [3332, 3333, 3334] with an internal 2.5V reference voltage. The output voltage of [7315] passes via an optocoupler [7314] for insulation of primary and secondary parts as a current value into pin 3 on the IC [7313]. The switch-on time of the transistor [7307] is inversely proportional to the value of this current.

Standby modes:
In the 'AV-Standby' operating mode of the set, the 'ION' control line is primarily used to switch off all output voltages for Basic Engine and Digital Board (supplies 3V3, 5V, 12V, 5N and 4V6 at Connectors 1932 and 1933) of the power supply. This reduces the amount of power taken from the mains. In Low Power Standby mode additionally the 'STBY' control line is used to switch off output voltages 5SW and 8SW. This reduces power consumption to less than 3W. The power supply will continue operating in Standby mode with a switching frequency of approx. 25 kHz.

9.3.3 Frontend

This unit is designed to support two basic versions, which are distinguished by a different assembly variant only (one for multistandard and the second for Pal-I only) and comprises the following parts:

- Tuner UV1316K [1705]
- IF amplifier & video demodulator IC TDA 9818/9817 [7710]
- Sound processor MSP3415G [7600]

Tuner and IF selection
The Tuner [1705] converts the RF-signal coming from the antenna input to an IF-signal. The tuner is fully controlled via I²C-bus of the CC-µP. [1705] is also equipped with a "passive-loop-through" between antenna-in and –out to save power in stand-by of the set, when the complete part is not supplied.
The IF frequency of the video carrier is 38.9 MHz for all systems except SECAM L' (34,0 MHz).
A quasi-split audio system is used. Separate surface-wave filters (SAW) are required. [1701], [1703] for video, [1702] for audio. [1701] is switched into the signal path for DK/I-SECAM L/L' reception, if the signal "SFS_TS" is "high". In this case the switches [7704], [7705] are open and the diode [6703] is conducting. [1703] is switched into the signal path for BG reception ("SFS_TS" is "low"). Then the switch [7712] is open and the diode [6704] is conducting. For DK/I-SECAM L/L' reception, an additional circuit for suppressing the audio carrier of the adjacent channel is used. This circuitry is adjusted by coil [5710] for maximum suppression at 40.4MHz.

IF demodulator
The signal from the tuner and IF-selection circuit is processed by the demodulator IC TDA 9818/9817 [7710]. The signal "PSS" to pin 3 switches between demodulation of positive (SECAM only) or negative modulated video carriers. A QSS-audio-IF signal SIF1 is generated for demodulation in the sound processor [7600]. The audio-IF carrier is selected in the audio SAW filter [1702]. This filter is switched for SECAM L'. If the signal "SB1" is "high", the switch [7714] is closed and the diode [6705] is not conducting. For all other standards the diode [6705] is conducting and the switch [7714] is open. The output signal of this SAW filter is firstly processed in the TDA 9818. Audio carriers are converted from the tuner IF level to the audio IF position and further processed in the audio demodulator [7600]. The AFC coil [5711] on the TDA 9818/9817 is adjusted so that when a frequency of 38.90 MHz is supplied to the IF output of the tuner, the AFC voltage on pin 17 of [7710] is 2.5V. The setting of the picture carrier frequency for SECAM L in the TDA 9818 is achieved by connecting pin 7 of the IC via a resistor [3710] to ground. The switch [7701] and the signal "SB1" do this. The HF-AGC is set using the potentiometer [3724] so that, with a sufficiently large antenna input signal (74 $dB_{\mu V}$), the voltage at the IF output of the tuner [1705] pin 11 is 500 mV_{pp}. This setting must be carried out when the audio carrier is switched off. The demodulated video signal appears on pin 16 of [7710]. The AGC voltage at pin 4 is used to determine the antenna signal strength after a buffer [7717] with the signal "AGC" and an analog input port of the CC-µP. The trap [1704] reduces the sound carrier remainders in the video for BG standards. The trap [1706] works in the same way for the Pal-I standard only. For all other standards the switch [7713] is closed via [7706] and "SFS_TS"-line set "high" to bypass this trap. In these cases the selectivity of the SAW filter [1701] is sufficient. The coil [5713] for non-BG standards realizes a frequency response correction. This correction is not desired for SECAM L' and therefore short-circuited by [7716] (signal SB1 is "high" and [7702] has on-status). The demodulated video signal "VFV" is available after the buffer and limiting stage for noise peaks [7711]. The FM-PLL demodulator function of TDA 9818 is not necessary and therefore deactivated by the resistor [3739].

Audio demodulator
The sound demodulation is done by the MSP3415 [7600], which is also fully controlled via I²C-bus by the CC-µP (determination of bandwidth, amplitude, standard, ...).The audio signals are available at pin 30 and pin 31 of [7600] and fed as "AFER"- & "AFEL"-line to the audio-I/O for further processing.

9.3.4 Audio routing

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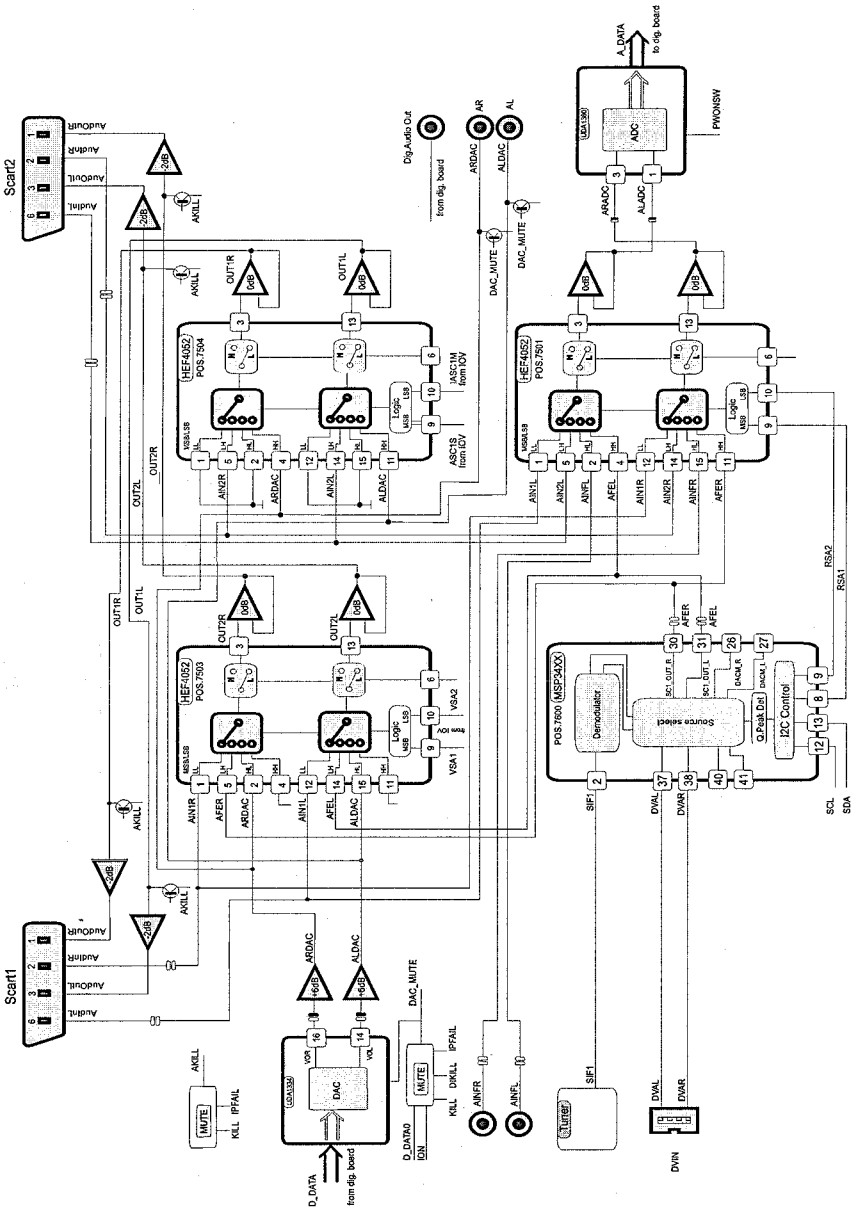
Audio IO Europa Overview



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The processing of audio is always done in stereo (e.g. separate left- and right-channel) and the complete switching is realized by using HEF4052, which is a dual four-to-one multiplexer. In principle there are three independent selectors:

a) Scart 1-Output-Path:

Pos [7504] is used to select either Scart 2-Input ("AIN2L"/"AIN2R") or the signal directly from the audio DAC [7001] ("ALDAC"/"ARDAC") as the output source for Scart 1 ("AOUT1L"/"AOUT1R").

The control is done by means of the lines "ASC1S" coming from [7408] (IC [7408] acts as a port expander for the CC-µP) and "IASC1M", which is directly coming from the CC. Pos [7412] is used for level adaptation (3V3 to 5V) in between.

b) Scart 2-Output-Path:

Pos [7503] selects between Scart 1-Input ("AIN1L"/"AIN1R"), signals from the internal frontend ("AFEL"/"AFER") via MSP [7600] or audio directly from the DAC [7001] ("ALDAC"/"ARDAC"). The outputs of this switch are routed to Scart 2 ("AOUT2L"/AOUT2R"). This switch is controlled via "VSA1"- and "VSA2"-line. These lines come from [7408] that is acting as a port expander for the CC-µP.

c) Record-Path:

Pos [7501] selects either signals from Scart 1 ("AIN1L"/"AIN1R") or Scart 2 ("AIN2L"/"AIN2R") or Cinch-Front ("AINFL"/"AINFR") or the MSP [7600] ("AFEL"/"AFER") and routes to the audio ADC [7005] ("ALADC"/"ARADC") for record purposes. The switch is controlled via "RSA1"- and "RSA2"-signals. These signals come from the MSP [7600], which acts as a port expander of the CC-µP. As there can also exist a fifth input in case of DV-In is present the corresponding analog audio signals from the DVIO-board are firstly routed via extra cable and connector [1960] to the MSP. The MSP acts as a preselector between audio from internal frontend or the DV-input.

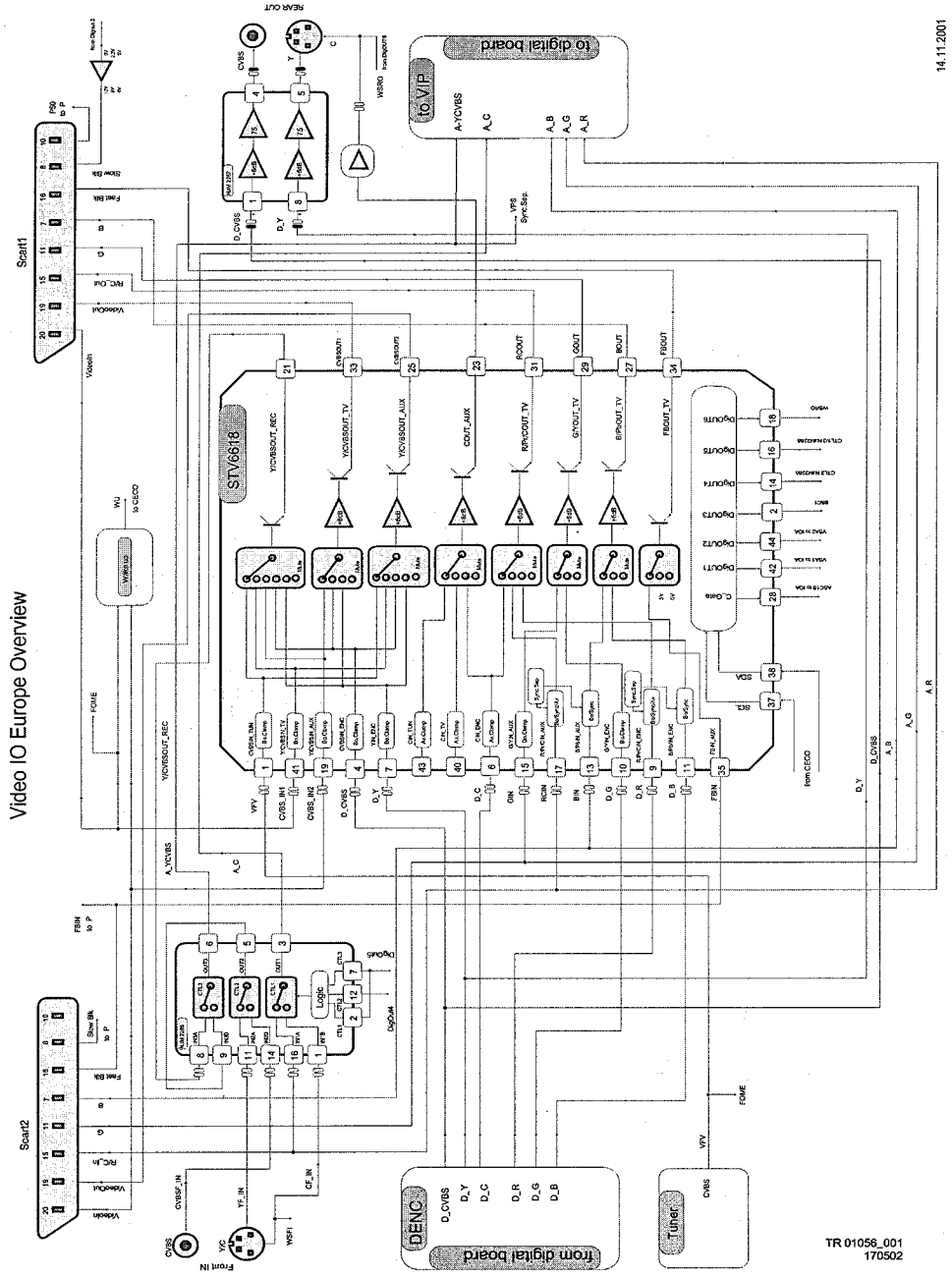
Each of these three selectors ([7501], [7503] & [7504]) has a separate Op-Amp on the output for level-adaptation-, performance- and line-driving-reasons. [7505-A & -B] for record, [7502-C & -D] for Scart 1-Output and [7502-A & -B] respectively for Scart 2. Every audio output line on the two Scart connectors can be "killed" (muted) by a extra transistors ([7506], [7508], [7509] &[7511]), which can be activated by the "AKILL"-line. This signal is generated by the circuit around [7404]/[7421] and is a combination of the "KILL"- from the CC-µP and the "IPFAIL" of the power-supply-unit.

Additionally to analog audio the set is also equipped with a digital output via cinch plug [1951]. The signal is generated on the dig. board and routed via audio interface cable and connector [1900] to the Ana-PCB. Here the "DAOUT"-line first passes a 6-fold inverter [7580] being used as a driver and for performance reasons (noise reduction, jitter, ...). Afterwards a transformer [5580] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3580] to cinch plug [1951]. The capacitor [2580] performs an AC-coupling between connector- and set-ground.

9.3.5 Audio ADC/DAC

The conversion of analog audio signals from the record-selector [7501] in the I/O ("ALADC"- & "ARADC") is done via UDA1361TS [7005]. This IC can process input signals up to $2V_{rms}$ by using external resistors [3039], [3041] in series to the input pins. As the level from the DVIO-Board is only $1V_{rms}$ a 6dB step can be performed by setting pin 7 of [7005] to 3,3V via [7006] and the "PWONSW"-line controlled by the CC-µP to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data ("A_DAT"-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back into the analog domain is done by UDA1334BTS [7001]. All necessary clock signals are coming from the dig. board and dig. audio data ("D_DATA0"-line) are converted into analog signals, which are available at pin 14 and pin 16 of [7001]. Afterwards an Op-Amp. [7002] (line driver & level adaptation) and a low-pass-filter to increase signal performance (noise, distortions,...). is passed. Then both signals ("ALDAC" & "ARDAC") are directly routed to the rear cinch output and also used in the audio-I/O for further processing. The DAC has also a mute possibility, which can be activated by setting pin 8 to 3,3V via [7003]. This mute is controlled either by the dig. board ("D_IKLL"-line) or the "IPFAIL"-signal from power-supply-unit.
In addition to that the DAC [7001] and the cinch outputs can be killed (muted) in case of "digital silence" by the circuit around [7008],[7009] and [7010], when no audio data are available (e.g. "D_DATA0"-line zero).
This function can be also activated via the "ION"-line (set to high during any stand-by mode). To avoid signal distortions (clipping) the mute transistors for cinch rear out [7415], [7416] are decoupled via [7011].

9.3.6 Video-routing



The complete Video-I/O-switching is basically realized by the matrix switch STV6618 [7408], which is controlled via I²C-bus by the CC. All used outputs excluding pin 21 (Y/CVBS-REC) have a 6 dB-amplification and a 75 Ohms driver-stage inside. This IC includes also several digital outputs, which are used for switching purposes on the analog board. The record selector inside the switch selects between the CVBS from frontend ("VFV"), the input from Scart 1 ("YCVBSIN1") or the signal from Scart 2 ("YCVBSIN2"). Afterwards the signal passes another switch [7411] in which a selection between signals from the front or the presetected ones are done. The output signals of [7411] are fed as "A_YCVBS"- and "A_C"-line to the digital board for further processing.

To reduce the number of external presets there exists only one preset for CVBS- and Y/C-front. The set automatically detects between the two inputs depending on the presence of a video signal (sync separator-circuit on mP-sub-board) where Y/C has higher priority.

The R/G/B-inputs and the Fast-Blanking-line from Scart 2 are directly routed to the digital PCB. These signals are also available on the corresponding input-pins of the STV6618 to enable a loop-through in AV-Standby. In this mode the set has to behave like a cable between the two Scart-connectors. AV-Standby is activated either by a "high" level on pin 8 of Scart 2 ("active device is present") or by the "WU"-line (wake up). This signal is generated out of the circuit around [7401], [7402] & [7403] and will become "high" if there is a signal on pin 20 of Scart 1- or Scart 2. The detection of the input level on pin 8 of Scart 2 ("8SC2") is done via an analog input of the CC-µP (less than 2V means inactive; 4,5V to 7V determines a source with 16:9 picture-ratio and greater than 9,5V is an active 4:3 source).

All signals from the digital board ("D_R", "D_G", "D_B", D_C", "D_Y" and "D_CVBS" are routed to the proper inputs of the STV6618 for amplification and driving purpose before they can be seen on the appropriate Scart outputs.

Parallel to this the "D_CVBS"- and the "D_Y"-line are passing a 6 dB-amplifier and driver-IC [7410] and are then routed to the CVBS-Cinch and Y/C-out rear. The chroma signal for this Y/C out is coming from the STV6618 - which makes the 6 dB-amplification - and a driver [7406] in between.

The detection of the picture ratio information on the Y/C-input front is made by measuring the DC-level on the Chroma signal via analog input of the CC-µP ("WSFI"-line). In case the level is higher than 3,5V the input signal is a 16:9 source. If the level is lower than 2,4V the picture ratio is 4:3.

For generation of the appropriate DC-voltage on the Y/C-out rear the "WSRO"-line is controlled via pin 18 of [7408] by the CC-µP (Pin 18 set to low means 4:3, pin 18 set to high determines 16:9).

The control of the switching voltage (Pin 8 of Scart 1) is done via 3-level-pin (nr.2) of the STV6618 [7408] and the transistors [7405], [7407] & [7409]. A "low" on pin 2 of [7408] causes around 11V on pin 8-Scart 1 (e.g. source with 4:3 picture-ratio active). Medium level (2,5V) on pin 2 of the STV6618 generates medium level (approx. 6V) on pin 8-Scart 1 (e.g. active source with 16:9) and a "high" on pin 2 of the STV6618 pushes pin 8-Scart 1 to "low" (e.g. inactive).

9.3.7 VPS/PDC- and Text-Datasilcer

For extraction of relevant information out of the video signal (time controlled recording, net-name-identification, time- & date- download) the STV5348 [7931] is used. Data transfer to/ from the CC is fully done via I²C-bus and the input signal for decoding is the same as the one being routed to the digital board for recording purposes ("A_YCVBS"-line).

9.3.8 Analog Follow-Me

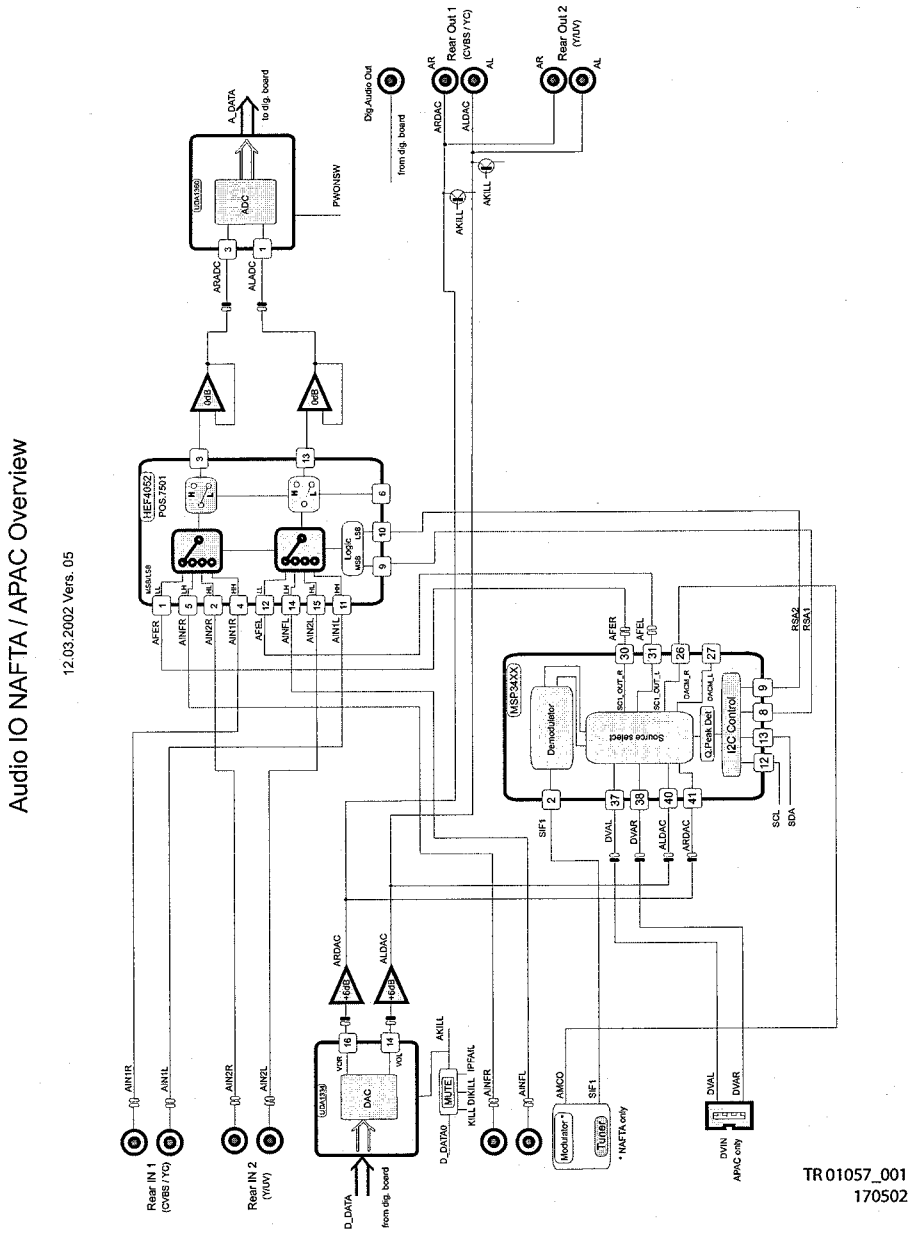
This circuit compares the video signal from the internal frontend ("VFV") of the recorder with that one of the connected TV-set ("CVBS1"). The TV set delivers the signal via Scart-cable. A comparator [7934] and several additional parts ([7932], [7933], ...) are used to compare the two video signals. In case of both input signals are equal the output-line of this circuit ("FOME") is set to low. Detection is made via an input port of the CC-µP.

9.4 Analog board NAFTA- & APAC-Pal- version

9.4.1 Frontend NAFTA

[1701] demodulates the video signal from the antenna input. Tuner and IF-demodulator are in one unit. Also a modulator is included in that part. The audio- and video-signal to the modulator are the ones from the selected input or the playback path of the set ("AMCO"- and "D_CVBS"-line). The control of the tuner is fully done via I²C-bus by the CC-µP. Via the "MSW"-signal and [7701] the modulator is switched on and off. In opposite to this the antenna loop-through is opened or closed. In the APAC-Pal version POS [1700] is used with the difference that it demodulates only PAL- instead of NTSC-signals and has also no modulator. The "CSW_SSW" line switches the modulator between CH3 or CH4 in the NTSC-version.
To achieve optimal tuning the "AFC"-signal is detected by the CC via an analog input; [3701], [3702] and [3703] are used for level adaptation (5V to 3V3). Pos [7700] is a driver for the video signal.
The sound demodulation is realized by the MSP34x5 [7600], which is also fully controlled via I²C-bus by the CC-µP (determination of bandwidth, amplitude, standard, ...). The audio signals are available at pin 30 and pin 31 of [7600] and fed as "AFER"- & "AFEL"-line to the audio-I/O for further processing. As this PCB is used for different regions (NAFTA and APAC) either MSP3425 or MSP3415 are assembled.

9.4.2 Audio routintg



The sound processing is always done in stereo (that means separate left- and right-channel). The complete selection of the audio signal for recording is done by a HEF4052 [7501], which is a dual four-to-one multiplexer. The Op-Amp on the output [7504] is necessary for performance reasons and acts also as a driver. The selected signals "ARADC" and "ALADC" are directly fed to the Audio-ADC. The input lines for the selector [7501] are coming either from MSP [7600] ("AFEL"/"AFER") or cinch rear in 1 ("AIN1L"/"AIN1R") or cinch rear in 2 ("AIN2L"/ "AIN2R") or the cinch in front ("AINFL"/AINFR"). The [7501] is controlled via "RSA1"- and "RSA2"-signals coming from the MSP [7600]. The MSP acts as a port expander of the CC-µP.

As there can exist also a fifth input in case of DV-In is present the corresponding analog audio signals from the DVIO-board are firstly routed via extra cable and connector [1960] to the MSP, which acts as a preselector between audio from internal frontend or the DV-Input.

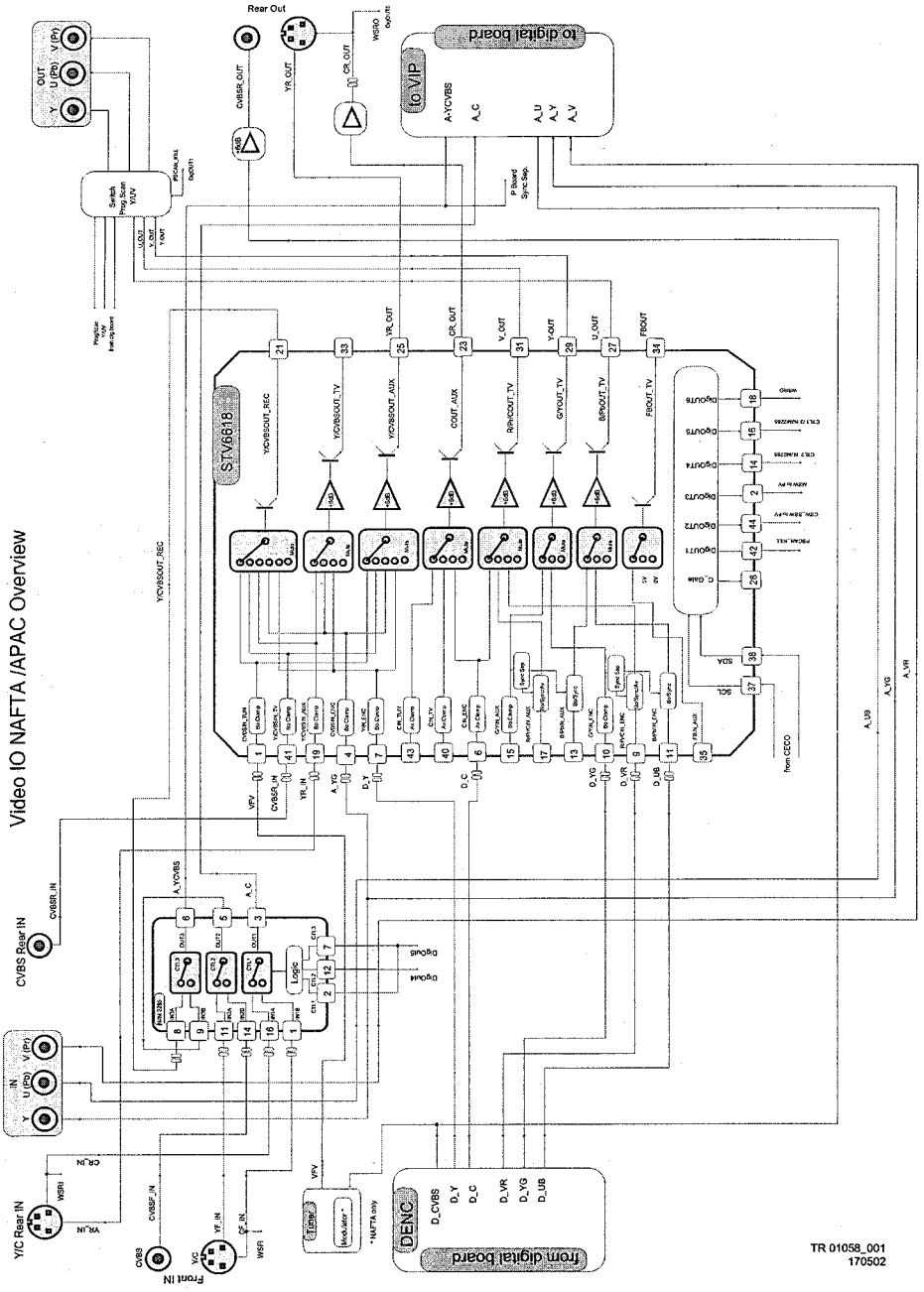
The signals from the audio DAC part ("ARDAC"/"ALDAC") are directly routed to both cinch rear outputs, which are connected in parallel. To avoid plops and any other audible noise on the output there is a mute-stage implemented [7509], [7511] for each channel. The activation is done via "AKILL"-line, which is a combination of the "KILL" from CC-µP, "DAC_Mute" from DAC-part and "IPFAIL" of the power-supply-unit. The circuit around [6430], [6431], [7430] and [7404] generates this signal.

Additionally to analog audio the set is also equipped with a digital output via cinch plug [1951]. The signal is generated on the dig. board and routed via audio interface cable and connector [1900] to the Ana-PCB. Here the "DACUT"-line first passes a 6-fold inverter [7580] being used as a driver and for performance reasons (noise reduction, jitter, ...). Afterwards a transformer [5580] is necessary to achieve the correct level and also to have a ground isolated (floating) output before the signal is fed via [3580] to cinch plug [1951]. The capacitors POS [2580], [2582] & [2583] perform on the one side an AC-coupling between connector- and set-ground. On the other side they are necessary to keep radiation at a minimum for EMC reasons.

9.4.3 Audio ADC/DAC

The conversion of analog audio signals from the record-selector [7501] in the I/O ("ALADC"- & "ARADC") is done via UDA1361TS [7005]. This IC can process input signals up to $2V_{rms}$ by using an external resistor [3039], [3041] in series to the input pins. As the level from the DVIO-Board is only $1V_{rms}$ a 6dB step can be performed by setting pin 7 of [7005] to 3,3V via [7006] and "PWONSW"-line controlled by the CC-µP to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data ("A_DAT"-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back to the analog domain is done by UDA1334BTS [7001]. All necessary clock signals are coming from the dig. board and dig. audio data ("D_DATA0"-line) are converted into analog signals, which are available at pin 14 and pin 16 of [7001]. Afterwards an Op-Amp. [7002] (line driver & level adaptation) and a low-pass-filter to increase signal performance (noise, distortions,...). are passed. Then both signals ("ALDAC" & "ARDAC") are directly routed to the rear cinch output. The DAC has also a mute possibility, which can be activated by setting pin 8 to 3,3V via [7003]. This mute is controlled either by the dig. board ("D_IKLL"-line) or the "IPFAIL"-signal from power-supply-unit.
In addition to that the DAC [7001] and the cinch outputs can be killed (muted) in case of "digital silence" by the circuit around [7008],[7009] and [7010], when no audio data are available (e.g. "D_DATA0"-line zero)

9.4.4 Video-routing



Block Diagram Digital Board

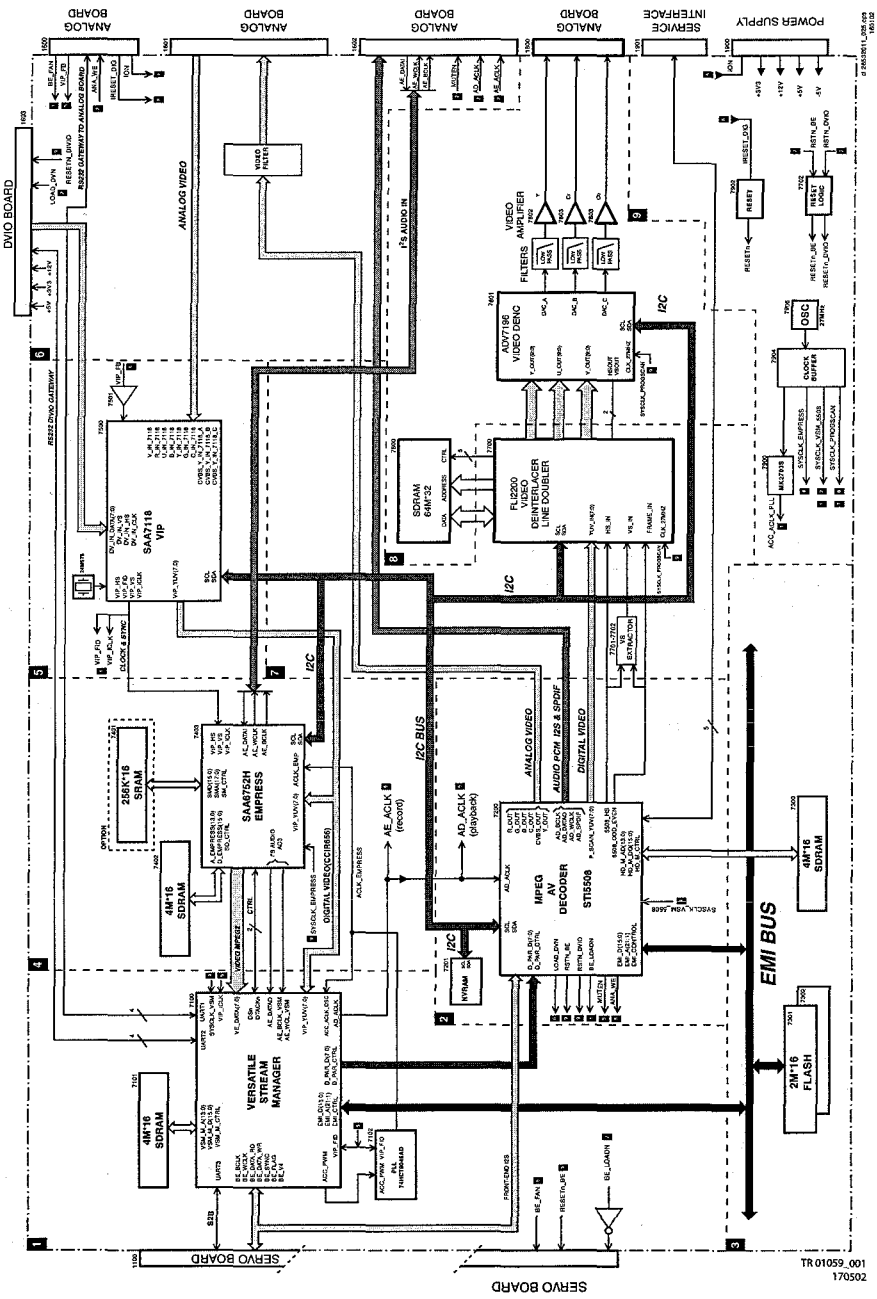


Figure 9-1

The complete Video-I/O-switching is basically realized by the matrix switch STV6618 [7408], which is controlled via I²C-bus by the CC. All used outputs excluding pin 21 (Y/CVBS-REC) have a 6dB-amplification and a 75 Ohms-driver-stage inside. This IC also includes several digital outputs, which are used for switching purposes on the analog board. The record selector inside the switch selects between the CVBS from frontend, the CVBS from Cinch-Rear or Y from the S-Video-input rear. Afterwards the signal passes another switch [7411] in which a selection between signals from the front or the preselected ones is done. The output signals of [7411] are fed as "A_YCVBS"- and "A_C"-line to the digital board for further processing.

To reduce the number of external presets there is only one station for CVBS or Y/C (front and rear). The set automatically detects between the two inputs depending on the presence of a video signal (sync separator-circuit on mP-sub-board) where Y/C has higher priority.

The Y/U/V-inputs are directly routed to the digital PCB. Only the Y-line has to be present additionally on pin 4 of [7408] for video recognition.

The signals "D_C" and "D_Y" are fed through [7408] (6dB amplification) and via [7406], [7409] used as driver to the S-Video output connector. The "D_CVBS" line is directly routed to the modulator and via the circuit around [7431] and [7432] amplified by 6dB before it is fed to the CVBS output plug.

The Y/U/V signals from the digital board are also passing [7408] for 6dB amplification and driving purpose.

To achieve optimal picture quality the set is equipped with a simple progressive scan function based on a so-called line doubler. The complete generation of the signal is done on the digital board and via a separate cable and connector [1946] the corresponding Y/U/V lines are routed to the analog PCB. As there is only one Y/U/V output available a switching between interlaced and progressive output is necessary. While the transistors [7421], [7422], [7424], [7425], [7427] and [7428] are used as driver for Y/U/V progressive, [7423], [7426] and [7429] together with [7405] are necessary for killing these signals via pin 42 of [7408] in case the interlaced is selected ("PSCAN_KILL"-line set to low). If progressive output is active the pins 27, 29 and 31 of [7408] are set to high impedance and "PSCAN_KILL" is also high (e.g. 5V).

The detection of the picture ratio information on the Y/C inputs (rear or front) is done by measuring the DC-level on the Chroma signal via an analog input of the CC-µP ("WSRI"- and "WSFI"-line). In case the level is higher than 3,5V the input signal is a 16:9 source, if the level is lower than 2,4V the picture ratio is 4:3.

For generation of the appropriate DC-voltage on the Y/C output the "WSRO"-line is controlled via pin18 of [7408] by the CC-µP (Pin 18 set to low means 4:3, pin 18 set to high determines 16:9).

During Stand-By there is also no loop-through of any input to any output performed.

9.5 Digital Board

9.5.1 Record Mode

Video Part

Analog Video input signals CVBS, YC and UV(RGB for EURO and YUV for USA) are routed via the analog board to connector 1601 and sent to IC7500 SAA7118 (Video Input Processor). Digital video input signals (DV_IN_DATA(7:0)) are sent from the DIVIO board through the connector 1603 and further also to IC7500.
IC7500 (VIP) encodes the analog video to digital video and processes the digital video to a digital video stream (CCIR656 format). This output stream (VIP_YUV[7:0]) goes to IC7403 SAA6752H (EMPRESS) and to IC7100 Versatile Stream Manager. The latter uses the data for VBI (vertical blanking interval) extraction.
IC7403 (EMPRESS) encodes the digital video stream into a MPEG2 video stream that is fed to IC7100 (VSM).

Audio Part

I2S audio are sent from the analog board to IC7403 EMPRESS via connector 1602. The EMPRESS compresses I2S audio data into an AC3 audio stream which is fed to IC7100 (VSM).

Front-End I2S

IC7100 (VSM) interfaces directly to the different hardware modules such as Basic Engine, EMPRESS IC7403, MPEG decoder IC7200 (Sti5508) and buffers the data streams that are coming from or going to these hardware modules.
In IC7100 (VSM), the video MPEG2 stream and the audio AC3 stream are multiplexed into a I2S packetized stream. The serial data are sent to the Basic Engine to be recorded.

Loop-Through

The multiplexed audio and video stream in the VSM is fed back via the parallel front-end interface to IC7200 (Sti5508). This IC decodes the MPEG stream into analog video and I2S audio. The video and audio signals are routed to the analog board via connectors 1601 and 1602. During recording, the recorded signal is present at the outputs of the analog board.

9.5.2 Playback Mode

During playback, the serial data from the Basic Engine is going directly to the Sti5505 via the serial front-end I2S interface. The Sti5508 is a MPEG & Audio/video decoder and has the following outputs:

- To the analog board:
  - analog video RGB, YC, CVBS
  - I2S audio (PCM format)
  - SPDIF audio (digital audio output)
- To the Progressive scan board:
  - digital video YC(7:0).

9.5.3 S2B Interface

The S2B interface between the VSM (IC7100) and the Servo processor MACE3 controls the Basic Engine during record and playback mode.

9.5.4 System Clock

System clocks(27MHz) of VSM, Sti5508, EMPRESS and Progressive Scan are generated by oscillator 7906

9.5.5 Audio Clock

During record mode, the audio clock ACC_ACLK_OSC is generated by IC7102 (PLL) because then, the audio clock must be sychronized with the incoming video (VIP_FID) from the VIP.
During playback mode, the audio clock ACC_ACLK_PLL is generated by the clock synthesizer IC7900 (MK2703S).
Both ACC_ACLK_OSC(also goes to the EMPRESS as ACLK_EMP) and ACC_ACLK_PLL are fed to the VSM. This IC selects the appropriate clock to the STI5508. The EMPRESS IC derives from the incoming ACLK_EMP the I2S audio encoder clocks AE_BCLK and AE_WCLK which are sent to the VSM.

9.5.6 On/Off

The digital board is not powered in standby mode. Control signal ION, coming from the analog board, will enable the PSU and power the digital board.

- ION = High: the digital board is in powered down standby mode
- ION = Low: the power supply to the digital board is enabled

9.5.7 Reset

Control signal IRESET_DIG, controlled by the microprocessor on the analog board is sent to the RESET LOGIC circuit.

- IRESET_DIG = Low in standby mode
- IRESET_DIG = High: the whole system is reset and the Digital board is waked up.

9.5.8 I2C Bus

Sti5508 is master of the I2C bus. The following IC's are controlled by the I2C bus:

- IC7201 NVRAM
- IC7403 EMPRESS
- IC7500 VIP
- IC7700 FLI2200 Video Deinterlacer Line Doubler
- IC7801 ADV7196 Video Denc

9.5.9 EMI Bus

The following IC's are connected to the External Memory Interface bus (EMI) which functions as system bus:

- IC7301 and 7302: Flash memories which contain the application and diagnostic software
- IC7100: VSM
- IC7200: MPEG AV Decoder

9.5.10 Progressive Scan

Description
The progressive scan part is integrated in the Digital Board and built around the SAGE FII2200 de-interlacer / line doubler (7701). This I2C controlled de-interlacer uses a 64Mbit SDRAM (32bit x 2M) to perform high quality deinterlacing (meshing). The de-interlacer gets his digital YUV input data from the STi5508 (7200). The format of the digital YUV input to the SAGE is CCIR656 with separated Hsync, Vsync and odd/even signal running on 27Mhz.
Because the STi5508 doesn't have a Vsync output the odd/even output of this IC has to be translated to a Vsync signal. Some glue logic has been added to extract the vertical sync. The glue logic circuit consists of Flip-Flop IC 74HC74D (7701) and EXOR 74LVC86 (7702). The next diagram shows how the vertical sync is extracted.

Vertical Sync

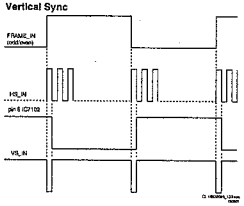


Figure 9-2

The output of the de-interlacer (4:4:4 progressive video) is fed to the Analog Devices ADV7197 MacroVision compliant DENC (7801).
The YUV current output of the DENC is fed via a low pass filter to the single supply output opamps AD8061/8062 (7802-7803). The analog video is fed via a 7 poled flex to the analog board where the YUV 2FH cinch connectors are located.

9.6 DvIo Board

9.6.1 Short Description of the Module:

The DVIO Module is a decoder for DV streams. The module is intended for the Philips DVDR1000/002 en DVDR1000/172 DVD+RW recorders. Input is a stream from a DV-camcorder IEEE1394. Outputs are CCIR656 Video and Analog audio (L+R). A serial control interface is present.
The following picture shows the location of the DVIO Module inside the DVDR set.

Description DVIO Module

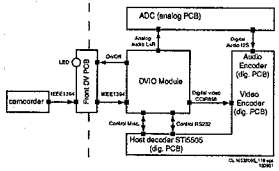


Figure 9-3

9.6.2 Block Diagram

Block Diagram DVIO

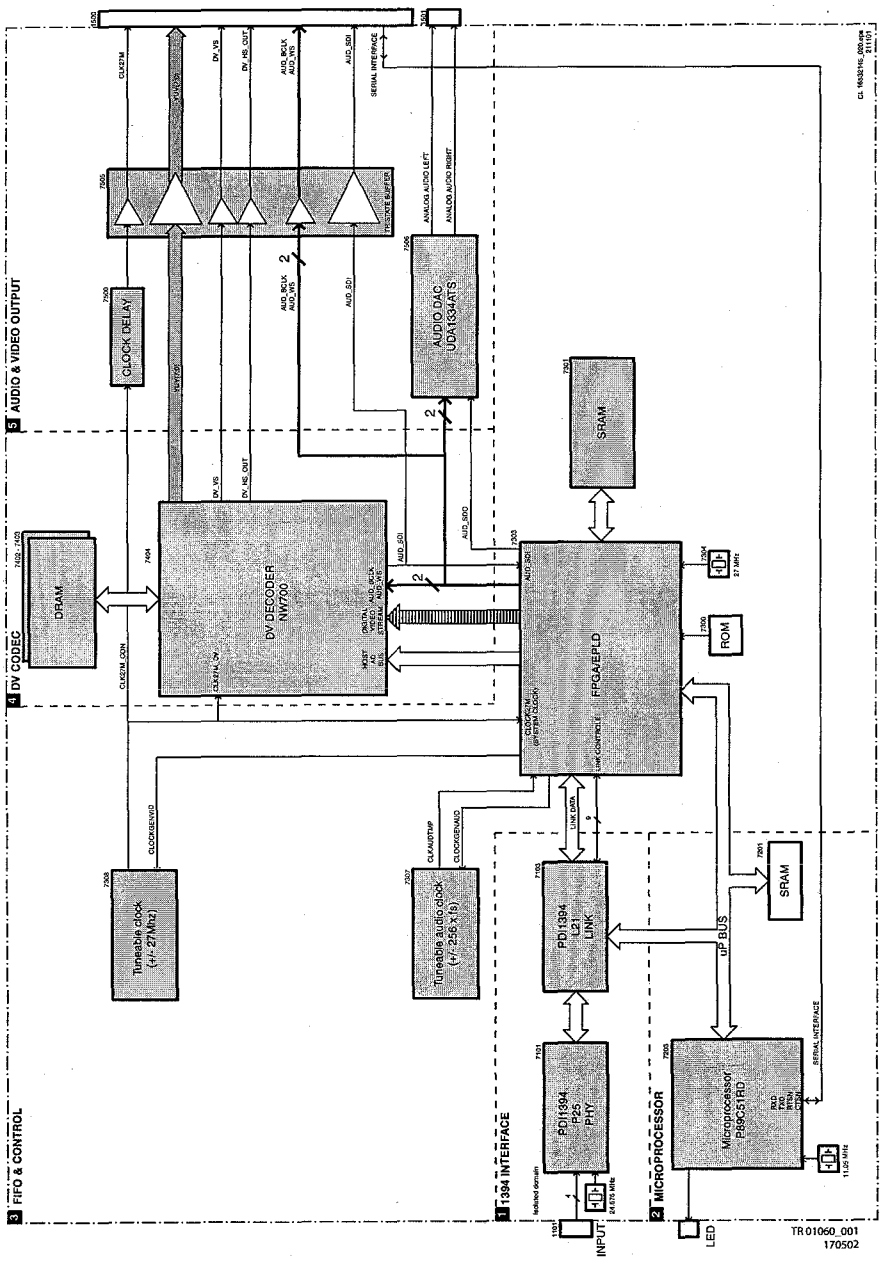


Figure 9-4

9.6.3 Functional Description

The DVIO module consists of the following blocks (see blockdiagram):

1. IEEE1394 Interface
   - PDI1394P25(7101)
   - PDI1394L40(7103)
2. Micro-controller
   - 89C51RD2(7203)
   - 32kb SRAM(7201)
3. FIFO and Control
   - FPGA/EPLD(7303)
   - SRAM(7301)
   - Clock generation(7307, 7308)
     - Independently tuneable audio and video clock, implemented with FPGA and PLL
4. DV-Decoder
   - NW700(7404)
   - EDO DRAM(7402, 7403)
5. Audio & Video output
   - Audio DAC UDA1334ATS(7602)
   - Clock delay(7500)
   - Tristate buffer(7505)

IEEE1394 Interface

The 1394 interface consists of a PDI1394P25 physical layer and a PDI1394L40 link layer.
It has the following features:

- S200 operation (200 megabit per second)
- One i.Link port (4 pin)
- AV link port

Micro-Controller

The 89C51RD2 processor has a 8051 cpu with the following extra features:

- 64 kilobyte of flash memory as program memory
- 1 kilobyte of internal data memory
- watchdog timer
- PCA outputs
- Power control modes
- Speed allowed up to 33 MHz but used at 11.0592 MHz
- On board ISP(In Circuit Programming) functionality

ISP

By use of In Circuit Programming, it is possible to update the software of the DVIO board that is in the 89C51RD2. ISP can be made active by resetting the processor and keeping the ISPN pin low during reset. During ISP, the ISPN signal on the board has to be kept low. A programming voltage of 5V is always present at the Vpp pin. When the ISP mode is active, the new program can be sent to the microprocessor through the serial port.

Fifo and Control

In decode mode, an isochronous AV-stream is flowing through the IEEE1394 interface into the FPGA. The FPGA stores the data in a FIFO buffer (ping-pong buffer type, i.e. 2 buffers that can hold one whole frame each).

Reset

The FPGA controls the reset signals on the board. This has the advantage that it is possible to reset the board both from software and hardware.

Reset

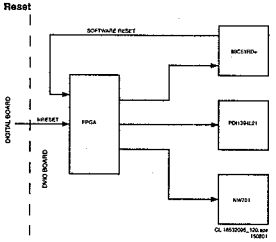


Figure 9-5

The board reset NRESET will reset the whole board, and the software reset can reset everything except the microprocessor itself. Power-on reset is implemented by adding pull-ups and pull-downs to the reset inputs of the devices. Since the FPGA will tri-state all the pins during configuration, reset is active during configuration time. After configuration of the FPGA, the reset signals are driven inactive. The NRESET signal is used to reset the DVIO board. After reset, the tri-state buffers to connector 1500 are disabled.

Clock Circuit

There are 2 clocks to consider in the system, this is the video clock and the audio clock. These two clocks do not have a relation, so these clocks must be considered independantly. The video clock is approximately 27 MHz. When data is flowing from an external source that is supposed to have the same frequency, it does not have exactly the same clock. Because of this, buffers may under-run of over-run. Since the clock can not be directly recovered from the 1394 interface, there has to be another solution. This solution is a tuneable clock that is adjusted to the required frequency to process at the rate of the incoming data.
The hardware implementation of such a tuneable clock is as follows:

Clock Circuit

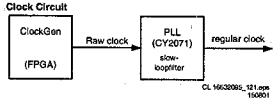


Figure 9-6

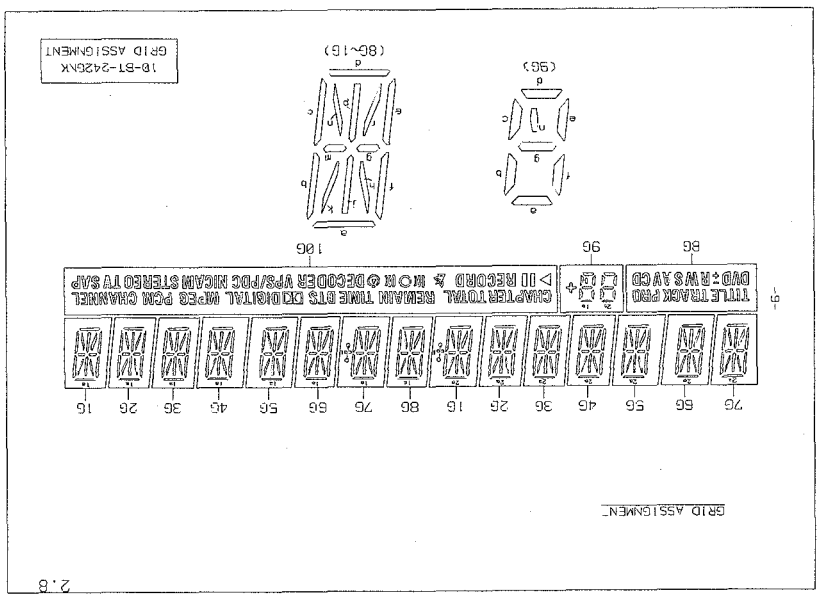
The same can be applied for the audio clock. For this clock, a frequency of 8.192 MHz, 11.2896 MHz or 12.228 MHz is required. This depends on the sample-rate frequency(32kHZ, 44.1kHZ or 48kHZ)of the audio signal.

DV Decoder

The AV-data will go from the FIFO to the NW700. The NW700 decodes the stream into video data in 656 format and audio data in I2S format.
The microprocessor has the ability to read the status registers of the NW700 through the FPGA. By reading these registers, extra data from the DV stream, that is not decoded into audio or video, can be sent to the digital board using pin TXD of the serial interface. This data includes time stamp and some more.

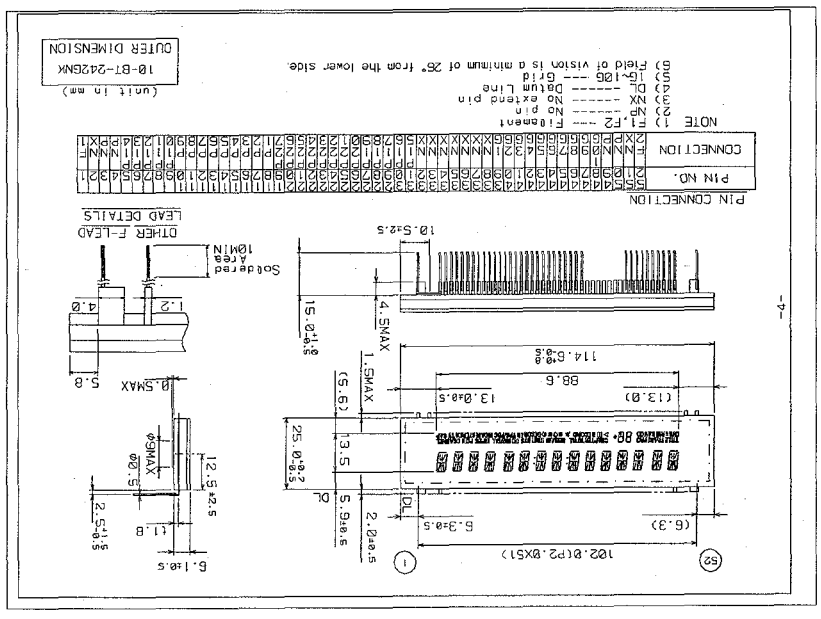
Audio & Video Output

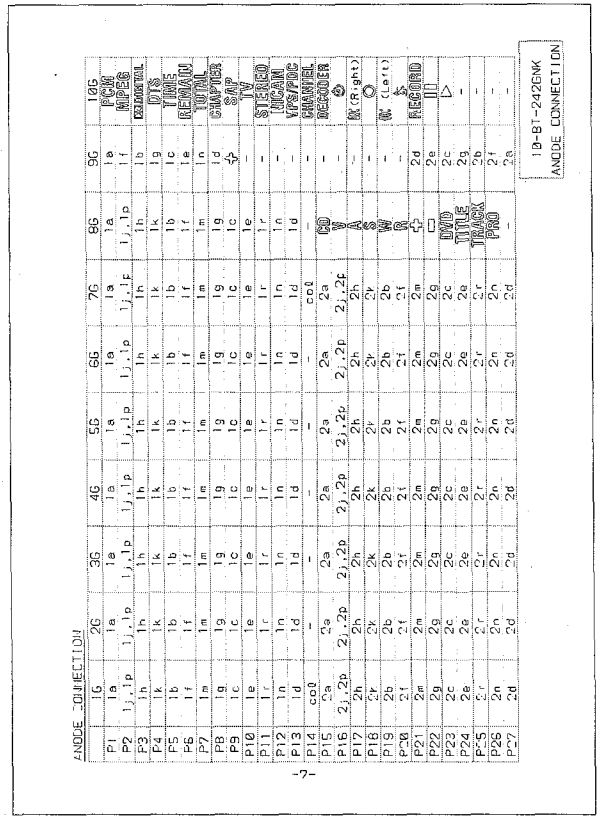
The audio I2S data are sent to audio DAC UDA1334. Analog audio left and right signals are connected to the analog board. The tristate buffer enables the digital video stream to the Video Input Processor on the digital board when the DV source is selected.
The clock delay synchronizes the AV clock with the AV data at the output.



9.7 IC's Display Panel

9.7.1 IC7100





9.8 IC's Analog Board

9.8.1 IC1705

PHILIPS Components — Preliminary specification

VHF/UHF splitter-tuner — **UV1316K MK3**

FEATURES

- Member of UV1300 MK3 family of small-sized UHF/VHF tuners
- Integrated passive splitter
- Systems CCIR: B/G, H, L, L', I and I'; OIRT: D/K
- Digitally-controlled (PLL) tuning via I²C-bus
- Fast 400kHz I²C bus protocol compatible with 3.3V and 5V micro controllers
- Off-air, S-cable and hyperband channels
- World standardized mechanical dimensions and pinning. Horizontal mounting is optionally available.

DESCRIPTION

The UV1316K MK3 splitter - tuner belongs to the UV1300 MK3 family of tuners, which are designed to meet a wide range of TV applications. It is a full band tuner suitable for CCIR systems B/G, H, L, L', I and I'. The low IF output impedance is designed for direct drive of a wide variety of SAW filters with sufficient suppression of triple transient. In addition, it is equipped with 2 two standard items, one a 5 level Analog Digital Converter and the other an internal wide band AGC with I²C selectable TOP.

This tuner complies with the requirements of radiation, signal handling capability and immunity conforming to:

- CISPR 13 (1990) incl. amendment 1 (1992) and amendment 2 (1993) and CISPR 20
- European standards CENELEC EN55013, EN55020

MARKING

The following items of information are printed on a sticker that is on the top cover of the tuner:

- Type number
- Code number
- Origin letter of factory
- Change code
- Year and week code

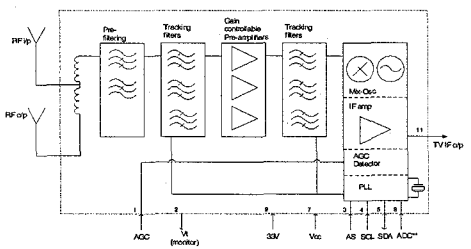
ORDERING INFORMATION

TYPE	DESCRIPTION	ORDER NUMBERS
UV1316K/A I G -3	Asymmetrical IF output; IEC connector	3139 147 17001

PHILIPS Components | Preliminary specification

VHF/UHF splitter-tuner | **UV1316K MK3**

BLOCK DIAGRAM



** ADC option not available in NTSC versions

PINNING

SYMBOL	PIN	DESCRIPTION
AGC	1	Gain Control Voltage
TU	2	Tuning voltage
AS	3	I²C-Bus Address Select
SCL	4	I²C-Bus Serial Clock
SDA	5	I²C-Bus Serial Data
n.c.	6	Not Connected
V_s	7	PLL Supply Voltage +5V
n.c./ADC	8	Not Connected / ADC Input (1)
V_{ST}	9	Fixed tuning Supply Voltage +33V
n.c	10	Do not connect
IF1	11	Asymmetrical IF Output
GND	M1,M2,M3,M4	Mounting Tags (Ground)

9.8.2 IC7408

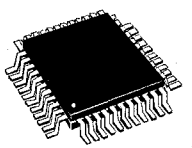
STV6618

VIDEO SWITCH MATRIX FOR DVD

TARGET SPECIFICATION

FEATURES

- I²C Bus Control
- 5 Y/CVBS Inputs, 3 Y/CVBS Outputs
- 3 C Inputs, 1 C Output
- 2 RGB/YPrPb Inputs, 1 RGB/YPrPb Output
- 6 dB Gain on all 150 Buffer Outputs
- Integrated 150 Buffers
- Video Muting on all Outputs
- Bottom Clamp on all CVBS/Y, Average Clamp on C Inputs, Bottom Clamp on RGB, Sync-tip Clamp on PrPb signals
- Bandwidth: 15 MHz
- Crosstalk: 50 dB



TQFP44
(10 x 10 x 1.4 mm)
(Thin Full Plastic Quad Flat Pack)

ORDER CODE: STV6618

DESCRIPTION

The STV6618 is a highly integrated I²C bus-controlled video switch matrix, optimized for use in recordable Digital Video Disk applications or DVD players. It provides video routings required for connections to two external devices (Europe 2 SCARTs), internal tuners, digital encoders and recorders.

1.2 Pin Description

Pin No.	Symbol	Description
1	Y/CVBSIN_TUN	Y/CVBS Input from Tuner
2	DIGOUT3	Digital Output Pin 3
3	GND1	Ground Supply 1 for Video Inputs
4	CVBSIN_ENC	CVBS Input from Encoder
5	DECV	Video decoupling capacitor
6	CIN_ENC	Chroma Input from Encoder
7	YIN_ENC	Y Input from Encoder
8	V_{CC}	+5 V Power Supply for Video Inputs
9	R/PR/CIN_ENC	Red or Pr or Chroma Input from Encoder
10	G/YIN_ENC	Green or Y Input from Encoder
11	B/PBIN_ENC	Blue or Pb Input from Encoder
12	GND2	Ground Supply 2 for Video Inputs
13	B/PBIN_AUX	Blue or Pb Input from Auxiliary (SCART2 or external Cinch)
14	DIGOUT4	Digital Output Pin 4
15	G/YIN_AUX	Green or Y Input from Auxiliary (SCART2 or external Cinch)
16	DIGOUT5	Digital Output Pin 5
17	R/PR/CIN_AUX	Red or Pr or Chroma Input from Auxiliary (SCART2 or external Cinch)
18	DIGOUT6	Digital Output Pin 6
19	Y/CVBSIN_AUX	Y/CVBS Input from Auxiliary (SCART2 or external Cinch)
20	VCCB_REC	Video Output Recorder Buffer Supply Pin
21	Y/CVBSOUT_REC	Y/CVBS Output to Recorder
22	GNDB_REC	Ground Supply for Recorder Buffer
23	COUT_AUX	Chroma Output to Auxiliary (SCART2 or external Cinch)
24	VCCB1	Video Output Buffer Supply Pin
25	Y/CVBSOUT_AUX	Y/CVBS Output to Auxiliary (SCART2 or external Cinch)
26	GNDB	Ground Supply for Video Buffer
27	B/PBOUT_TV	Blue or Pb Output to TV (SCART1 or external Cinch)
28	C_GATE	External Transistor Command for Bidirectinnal B/C SCART I/O
29	G/YOUT_TV	Green or Y Output to TV (SCART1 or external Cinch)
30	VCCB2	Video Buffer
31	R/PR/COUT_TV	Red or Pr or Chroma Output to TV (SCART1 or external Cinch)
32	VCCB3	Video Output Buffer Supply Pin
33	Y/CVBSOUT_TV	Y/CVBS Output to TV (SCART1 or external Cinch)
34	FBOUT_TV	Fast Blanking Output to TV (SCART1)
35	FBIN_AUX	Fast Blanking Input from Auxiliary (SCART2)

Pin No.	Symbol	Description
36	VDD	+5 V Digital Power Supply
37	SCL	I²C Bus Clock
38	SDA	I²C Bus Data
39	GNDD	Digital Ground Supply
40	CIN_TV	Chroma Input from TV (SCART1 or external Cinch)
41	Y/CVBSIN_TV	Y/CVBS Input from TV (SCART1 or external Cinch)
42	DIGOUT1	Digital Output Pin 1
43	CIN_TUN	Chroma Input from Tuner
44	DIGOUT2	Digital Output Pin 2

Figure 2: STV6618 Input/Output Diagram

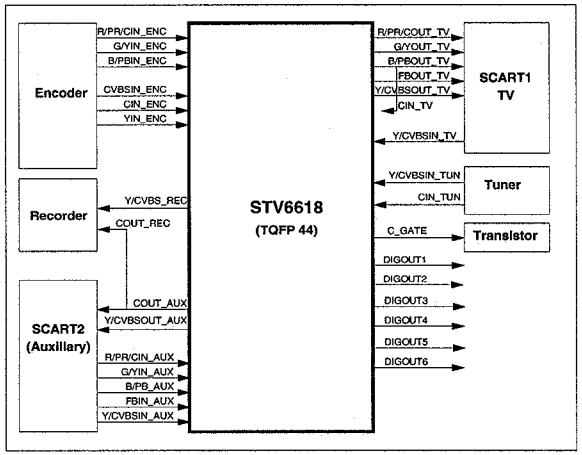
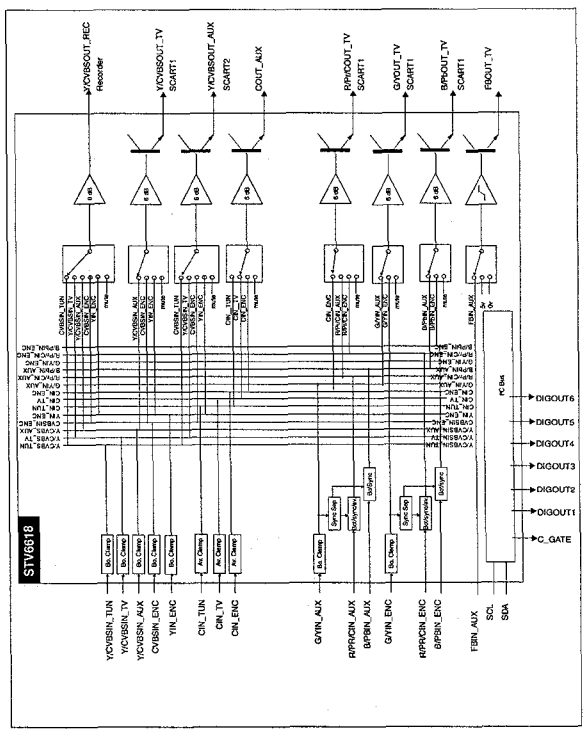


Figure 3: STV6618 Block Diagram



IC7411

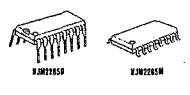
JRC **NJM2285**

2-INPUT 3CHANNEL VIDEO SWITCH

■ GENERAL DESCRIPTION

NJM2285 is a switching IC for switching over from one audio or video input signal to another. Internalizing 2 inputs, 1 output, and then each set of 3 can be operated independently. Two of them are Clamp type*, and they can be operated while setting DC level fixed in position of the video signal. It is a higher efficiency video switch, featuring the operating supply voltage 5 to 12V, the frequency feature 10MHz, and then the crosstalk 75dB (at 4.43MHz).

■ PACKAGE OUTLINE



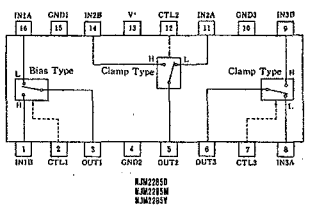
■ FEATURES

- 2 Input-1 Output
  Internalizing 3 Circuits (Two of them are Clamp type).
- Wide Operating Supply Voltage (4.75 ~ 13.0V)
- Crosstalk 75dB(at 4.43MHz)
- Wide Bandwidth Frequency Feature 10MHz(2Vp-p Input)
- Package Outline DIP16, DMP16, SSOP16
- Bipolar Technology

■ APPLICATIONS

- VCR, Video Camera, AV-TV, Video Disk Player.

■ BLOCK DIAGRAM



5

IC7313

GreenChip™II SMPS control IC — TEA1507

FEATURES

Distinctive features

- Universal mains supply operation (70 to 276 V AC)
- High level of integration, giving a very low external component count.

Green features

- Valley/zero voltage switching for minimum switching losses
- Efficient quasi-resonant operation at high power levels
- Frequency reduction at low power standby for improved system efficiency (<3 W)
- Burst mode operation for very low standby levels (<1 W)
- On-chip start-up current source.

Protection features

- Safe restart mode for system fault conditions
- Continuous mode protection by means of demagnetization detection (zero switch-on current)
- Accurate and adjustable overvoltage protection
- Short winding protection
- Undervoltage protection (foldback during overload)
- Overtemperature protection
- Low and adjustable overcurrent protection trip level
- Soft (re)start
- Mains voltage-dependent operation-enabling level.

APPLICATIONS

Besides typical application areas, i.e. TV and Monitor supplies, the device can be used in all applications that demand an efficient and cost-effective solution up to 250 W.

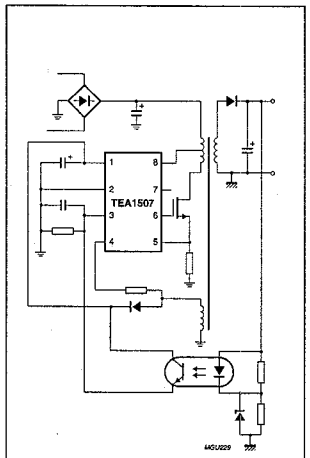


Fig.1 Typical application.

BLOCK DIAGRAM

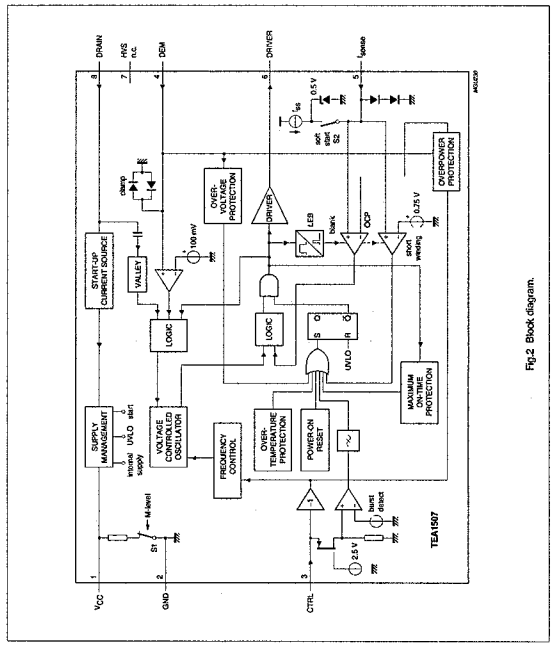


Fig.2 Block diagram.

9.9 IC'sUPC12 Sub PCB

9.9.1 IC7825

Ordering number:ENN2874A

Monolithic Linear IC

LA7213

VCR-Use Automatic Channel Selection Peripheral

Overview

The LA7213 is a VCR-use automatic channel selection peripheral IC that contains a sync separator and a vertical sync separator.

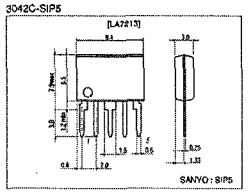
Functions and Features

- Sync separation.
- Vertical sync separation.
- Recommended supply voltage : 5V
- Open collector output (R_L=10k), negative polarity output.

Package Dimensions

unit:mm

3042C-SIP5



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		7.0	V
Allowable power dissipation	Pd max	Ta ≤ 75°C	100	mW
Operating temperature	Topr		−15 to +75	°C
Storage temperature	Tstg		−40 to +125	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5.0	V
Operating voltage	V_{CC} op		4 to 6	V

Operating Characteristics at Ta = 25°C, V_{CC}=5V

Parameter	Symbol	Conditions	Ratings min	Ratings typ	Ratings max	Unit
Circuit current	I_{CC}	No load	0.5	0.9	1.5	mA
Sync separation operating current	I_{SYNC}	SW1=b		85		µA
Sync separation minimum input level	V_i min	Color bar signal 1Vp-p×(0to5), SW1=a		−12		dB
Vertical sync separation output time delay	$T_{D(OUT)}$	Color bar of input=1Vp-p, SW1=a	5	10	20	µs
Output DC level	V_{OH}	No load	4.8			V
Output DC level	V_{OL}	No load			0.2	V
Output DC level	V_{OH}	No load	4.8			V
Output DC level	V_{OL}	No load			0.2	V

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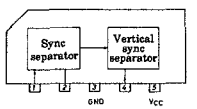
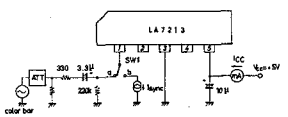
LA7213

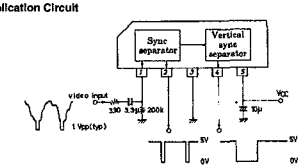
Block Diagram



Test Circuit



Sample Application Circuit



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IC7806

NCP300, NCP301

Voltage Detector Series

The NCP300 and NCP301 series are second generation ultra−low current voltage detectors. These devices are specifically designed for use as reset controllers in portable microprocessor based systems where extended battery life is paramount.

Each series features a highly accurate under voltage detector with hysteresis which prevents erratic system reset operation as the comparator threshold is crossed.

The NCP300 series consists of complementary output devices that are available with either an active high or active low reset output. The NCP301 series has an open drain N−channel output with either an active high or active low reset output.

The NCP300 and NCP301 device series are available in the Thin SOT−23−5 package with seven standard under voltage thresholds. Additional thresholds that range from 0.9 V to 4.9 V in 100 mV steps can be manufactured.

Features

- Quiescent Current of 0.5 μA Typical
- High Accuracy Under Voltage Threshold of 2.0%
- Wide Operating Voltage Range of 0.8 V to 10 V
- Complementary or Open Drain Reset Output
- Active Low or Active High Reset Output

Typical Applications

- Microprocessor Reset Controller
- Low Battery Detection
- Power Fail Indicator
- Battery Backup Detection

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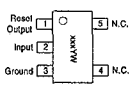
THIN SOT−23−5
SN SUFFIX
CASE 483

PIN CONNECTIONS AND MARKING DIAGRAM

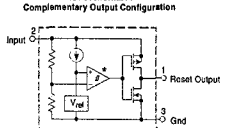


xxx = 300 or 301
Y = Year
W = Work Week
(Top View)

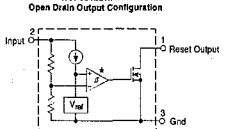
ORDERING INFORMATION

See detailed ordering and shipping information in the ordering information section on page 23 of this data sheet.

NCP300xSNxxT1
Complementary Output Configuration



NCP301xSNxxT1
Open Drain Output Configuration



* The representative block diagrams depict active low reset output 'L' suffix devices. The comparator inputs are interchanged for the active high output 'H' suffix devices.

This device contains 25 active transistors.

Figure 1. Representative Block Diagrams

© Semiconductor Components Industries, LLC, 2001

OPERATING DESCRIPTION

The NCP300 and NCP301 series devices are second generation ultra−low current voltage detectors. Figures 21 and 22 show a timing diagram and a typical application. Initially consider that input voltage V_{in} is at a nominal level and it is greater than the voltage detector upper threshold (V_{DET+}), and the reset output (Pin 1) will be in the high state for active low devices, or in the low state for active high devices. If there is a power interruption and V_{in} becomes significantly deficient, it will fall below the lower detector threshold (V_{DET-}). This sequence of events causes the Reset output to be in the low state for active low devices, or in the high state for active high devices. After completion of the power interruption, V_{in} will again return to its nominal level and become greater than the V_{DET+}. The voltage detector has built−in hysteresis to prevent erratic reset operation as the comparator threshold is crossed.

Although these device series are specifically designed for use as reset controllers in portable microprocessor based systems, they offer a cost−effective solution in numerous applications where precise voltage monitoring is required. Figure 22 through Figure 29 shows various application examples.

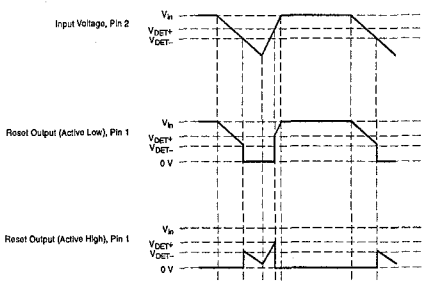


Figure 21. Timing Waveforms

9.10 IC's Digital Board

9.10.1 IC7100: VSM

VERSATILE STREAM MANAGER

GENERAL DESCRIPTION

The Versatile Stream Manager (VSM) is an ASIC used in the first generation DVD Video Recorder. Main function of the VSM is to interface directly to the different hardware modules such as Basic Engine, MPEG encoders, MPEG decoders and buffering the data streams that are coming from or going to these hardware modules.
The VSM contains a memory interface to support one 4M*16 SDRAM device. A host interface allows a CPU to directly access this memory and the VSM s internal registers.
Handling of data streams is done using scatter / gather DMA s under software control. Hardware support is provided in the VSM to support software MPEG AV multiplexing.

FEATURES

The VSM features include:

- SDRAM memory interface to support one 4 banks*1M*16 (64Mbit) SDRAM device.
- Glueless Host Interface for STM s STi5505.
- Glueless MPEG Decoder interface for STM s STi5505 .
- Glueless interface to Philips SAA6750 MPEG Video Encoder or SAA6752 MPEG AV Encoder.
- Glueless interface to Motorola s DSP56362 used as MPEG Audio Encoder.
- Glueless interface to Philips HDR65 as part of Basic Engine interface including the Sector Processor as also included in the STi5505.
- Audio Clock Control providing PLL loop and clock lock detection.
- Double Extraction of VBI decoded data from extended CCIR 656 stream.
- Double UART with hardware handshake and 8 byte Rx/Tx FIFO.
- Generation of additional Host Bus to support Audio Encoder DSP56362.
- Descriptor based DMA Controllers for data stream handling.
- Hardware support for software MPEG multiplex process.
- Internal Interrupt Controller to handle internal and 4 external interrupt sources.
- Operates from single 27 MHz clock input.
- JTAG for production tests.
- 3.3V logic core.
- 3.3V / 5V toleration IO pins.
- 208 PIN LQFP Package. (CR1087)

BLOCK DIAGRAM

Figure 2.1 shows the block diagram of the VSM. The hardware blocks can be divided in to three categories:

- General modules: Host Interface, Memory Interface, Interrupt Controller.
- DMA Controllers.
- Functional Interfaces; the link between the actual external hardware interface and the DMA Controller. Some Functional Interfaces have knowledge about the stream coming through in order to perform for example MPEG stream characteristics extraction and insertion.

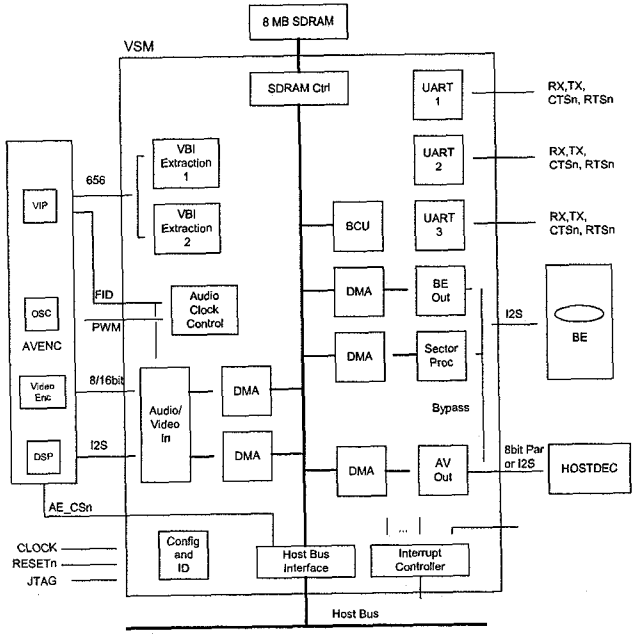


Figure 2.1: VSM Overview

PINNING

OVERVIEW

Name	Pins	Type	Function
System			
RESETn	1	In	
SYSCLK (27MHz)	1	In	
Host Interface			
HO_A(21:1)	21	In	
HO_D(15:0)	16	In/Out	
HO_BEn(1:0)	2	In	
HO_RWn	1	In	
HO_CSLn	1	In	
HO_CSHn	1	In	
HO_A22	1	In	
HO_WAIT	1	Out	
HO_PROCCLK	1	In	
Memory Interface			
M_A(13:0)	14	Out	
M_DQ(15:0)	16	In/Out	
M_RASn	1	Out	
M_CASn	1	Out	
M_WEn	1	Out	
M_LDQM	1	Out	
M_UDQM	1	Out	
M_CLKOUT	1	Out	
M_CLKEN	1	Out	
Basic Engine Interface			
BE_BCLK	1	In	
BE_DATI	1	In	
BE_WCLK	1	In	
BE_SYNC	1	In/Out	
BE_FLAG	1	In	
BE_V4	1	In	
BE_DATO	1	Out	
Video Encoder Interface			
VE_D(15:0)	16	In	
VE_DSn	1	Out	
VE_DTACKn	1	In	
VE_VIP_ERROR	1	In	Signal coming from SAA7114
Audio Encoder Interface			
AE_CSn	1	Out	
AE_BCLK	1	In/Out	(CR151,CR157)
AE_WCLK	1	In/Out	(CR151,CR157)
AE_DATA	1	In	(CR157)

Decoder Interface			
D_PAR_D(7:0)	8	Out	
D_PAR_DVALID	1	Out	
D_PAR_STR	1	Out	
D_PAR_REQ	1	In	
D_PAR_SYNC	1	Out	
D_WCLK	1	Out	
D_V4	1	Out	
Audio Clock Control			
ACC_FID	1	In	(CR200)
ACC_PWM	1	Out	
ACC_ACLK_OSC	1	In	
ACC_ACLK_DAI	1	In	
ACC_ACLK_PLL	1	In	
ACC_ACLK_DEC	1	Out	
VBI Extractor			
VBI_IPD(7:0)	8	In	
VBI_ICLK	1	In	
UART 1			
UART1_RX	1	In	
UART1_TX	1	Out (OC)	
UART1_CTSn	1	In	
UART1_RTSn	1	Out (OC)	
UART 2			
UART2_RX	1	In	
UART2_TX	1	Out (OC)	
UART2_CTSn	1	In	
UART2_RTSn	1	Out (OC)	
UART 3 (VSM1B)			
UART3_RX	1	In	
UART3_TX	1	Out	
UART3_CTSn	1	In	
UART3_RTSn	1	Out	
Interrupt Controller			
EXTINT(3:0)	4	In	From: VEnc, AEnc, BE, VSync (STi5505)
CPUINT(1:0)	2	Out (OC)	
JTAG			
TCK	1	In	Boundary Scan
TDI	1	In	
TDO	1	Out/Z	
TMS	1	In	
TRSTn	1	In	
Test			
TEST0	1	In	Amsal Test
TEST1	1	In	
Power Supply			
VDD	20	Power	10% of total pins package
VSS	20	Power	10% of total pins package
Total Pins	208		

9.10.2 IC7403: SAA6752H (EMPRESS)

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer — SAA6752HS

1 FEATURES

1.1 Video input and preprocessing

- Digital YUV input according to *"ITU-R BT.656"* (8 bits at 27 MHz) and *"ITU-R BT.601"*
- Support of enhanced *"ITU-R BT.656"* input format containing decoded VBI data readable via I²C-bus; Closed Caption (CC), Wide Screen Signalling (WSS) and copyright information [Copy Generation Management System (CGMS)]
- Processing of non broadcast video signals from analog VCR according to IEC 756
- Two video clock input pins for switching two digital video sources
- *"ITU-R BT.601"* format conversion to 1/2D1, 2/3D1 and Standard Interchange Format (SIF)
- 4 : 2 : 2 to 4 : 2 : 0 colour format conversion
- Decimation filtering for all format conversions
- Adaptive median filter and motion compensated filter for input noise reduction.

1.2 Video compression

- Real time MPEG-2 encoding compliant to Main Profile at Main Level (MP@ML) for 625 and 525 interlaced line systems
- Supported resolutions: D1, 2/3D1, 1/2D1 and SIF
- IPB frame, IP frame and I frame only encoding supported at all modes
- Supported bit rates: up to 25 Mbit/s I-only encoding; up to 15 Mbit/s IP-only or IBP encoding.
- Variable video bit rate mode for constant picture quality and constant bit rate mode to gain optimum picture quality from a fixed channel transfer rate
- Access to bit rate control parameters whilst encoding to support external real-time control algorithms (e.g. constrained variable bit rate control)
- Programmable Group Of Pictures (GOP) structure
- Innovative motion estimation with wide search range
- Adaptive quantization
- Motion compensated noise filter.

1.3 Audio input

- Audio inputs: I²S format or EIAJ format (16, 18 or 20 bits), master or slave mode at 32, 44.1 and 48 kHz
- Two digital I²S input ports for selection between two digital audio sources
- Audio clock generation: 256/384 × f_s (48 kHz) locked to video frame rate (if video is present)
- Sample rate conversion to 48 kHz (locked to video frame rate) for slave mode operation in all modes except Digital Versatile Disc (DVD) compliant bypass.

1.4 Audio compression

- Dolby®(1) Digital Consumer Encoding (DDCE) also known as AC-3(2) 2 channel audio encoding at 256 kbit/s or 384 kbit/s (only for SAA6752HS/01)
- MPEG-1 layer 2 audio encoding at 256 kbit/s or 384 kbit/s
- Input data bypass for Linear Pulse Code Modulation (LPCM) and compressed audio data [MPEG-1, MPEG-2, Dolby® Digital (DD) and Digital Theatre System (DTS)] according to IEC 61937
- Preamble Pc, Preamble Pd and bit stream information captured for identification of modes during bypass of compressed audio data for MPEG-1, MPEG-2, DD and DTS according to IEC 61937
- Audio mute via I²C-bus control for all modes except DVD-compliant bypass.

1.5 Stream multiplexer

- Multiplexing of video and audio streams according to the MPEG-2 systems standard (*"ISO 13818-1"*)
- Generation and output of MPEG-2 Transport Streams (TS), MPEG-2 Program Streams (PS), Packetized Elementary Streams (PES) and Elementary Streams (ES) compliant to the DVD, D-VHS and DVB standards
- MPEG time stamp (PTS/DTS/SCR/PCR) generation and insertion (synchronization)
- Insertion of metadata
- Optional generation of empty time slots for subsequent insertion of application specific data packets
- Optional insertion of user data in the GOP header and in the picture header.

(1) Dolby is a registered trademark of Dolby Laboratories Licensing Corporation.
(2) AC-3 is a registered trademark of Dolby Laboratories Licensing Corporation.

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer — SAA6752HS

1.6 Output interface

- Parallel interface 8-bit master/slave output
- 3-state output port
- Glueless interfacing with IEEE 1394 chip sets (for example, PDI 1394 L11)
- Data Expansion Bus Interface (DEBI) interface.

1.7 Control domain

- All control done via I²C-bus
- I²C-bus slave transceiver up to 400 kHz
- I²C-bus slave address select pin
- Host interrupt flag pin.

1.8 Other features

- Single external clock or single crystal 27 MHz
- Separate 27 MHz system clock output
- Interface voltage 3.3 V
- TTL compatible digital outputs
- Power supply voltage 3.3 and 2.5 V
- Boundary Scan Test (BST) supported
- Power-down mode
- Single SDRAM system memory (16 Mbit@16 bit or 64 Mbit@16 bit).

2 GENERAL DESCRIPTION

2.1 General

Philips Semiconductors' second generation real time MPEG-2 encoder, the SAA6752HS, is a highly integrated single chip audio and video encoding solution with very flexible multiplexing functionality. With our expertise in two critical areas for consumer video encoding, noise filtering and motion estimation, we have pushed the boundaries for video quality even further, providing enhanced quality for low bit rates and enabling increased recording times for a given storage capacity. The SAA6752HS will also enable a key driver for new consumer digital recording applications; system cost reduction. By integrating all audio encoding and multiplexing functionality we will be moving from a three chip to a one chip system, with cost efficient design and process technology, thus providing a truly low cost, high quality encoding system.

The SAA6752HS/02 is intended for customers whose application does not require the DDCE function.

The SAA6752HS gives significant advantages to customers developing digital recording applications:

- **Fast time-to-market and low development resources:** By adding a simple external video input processor IC, audio analog-to-digital converter, and an external SDRAM, analog video and audio sources are compressed into high quality MPEG-2 video and MPEG-1 layer 2 or AC-3 audio streams, multiplexed into a single program or transport stream for simple connection to various storage media or broadcast media. Hence, making design effort for our customers a minimum, as well as removing the need for in-depth experience in MPEG encoding.
- **Low system host resources:** All video and audio encoding algorithms and software are run on an internal MIPS®(1) processor. The SAA6752HS only requires small amount of communication from system host processor to set up and control required encoding parameters via I²C-bus.

2.2 Application ?elds

2.2.1 DVD BASED OPTICAL DISC RECORDERS (DVD+RW, DVD-RW, DVD-RAM)

Emerging optical disc based recording systems target to replace the existing consumer recording (VCR) and playback (DVD and VCD) products. The first generation recordable DVD based products will want to maximise recording times for the 4.7 Gbyte storage capacity. For these systems the SAA6752HS is critical, with its superior noise filtering and motion estimation, in enabling high quality at low bit rates.

Playback compatibility with existing DVD decoding solutions will also be important, which is why the SAA6752HS provides Dolby® digital consumer (AC-3) audio encoding to allow playback through existing players implementing DDCE (AC-3) decoding dominant in current DVD platforms.

The DVD stream is based on MPEG Program Stream (PS). The SAA6752HS directly outputs MPEG PS compliant to the DVD standard.

(1) MIPS is a registered trademark of MIPS Technologies.

2.2.2 HDD BASED TIME SHIFT RECORDING

Hard Disc Drive (HDD) based time-shift systems enable Personalized TV (PTV) functionality, providing consumers with new powers of control over what and when to watch broadcast content. With the audio and video content recorded digitally, identification, search and retrieval becomes a 'no brainer' task as compared to traditional VCR functionality. Combine this with electronic program guides and intelligent control, and the PTV can also analyse the viewers watching habits to search for programs likely to be of interest and automatically recorded in anticipation of the viewers preferences.

Since HDD recorders are closed systems, the recording format stream can be proprietary. SAA6752HS flexible multiplexing formats, support a number of recording stream formats for HDD including MPEG Transport Stream (TS) or MPEG Packetized Elementary Stream (PES).

2.2.3 DIGITAL VCR (DVHS) RECORDING

A DVHS player records streams based on MPEG Transport Streams (TS) packed in logical tape tracks. The SAA6752HS output streams are compliant with DVHS standard requirements.

2.2.4 VIDEO EDITING/TRANSMISSION/SURVEILLANCE/ CONFERENCING

The SAA6752HS can operate as a stand-alone device in all above applications. The SAA6752HS' full features and flexibility allows customers to tailor functionality and performance to specific application requirements. All required control settings such as GOP size and bit rate modes can be selected via I²C-bus.

3 QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_{DDP}	digital supply voltage (pad cells)	3.0	3.3	3.6	V
V_{DDCO}	digital supply voltage (core)	2.3	2.5	2.7	V
V_{DDA}	analog supply voltage (oscillator and PLL)	2.3	2.5	2.7	V
$I_{DD(tot)}$	analog + digital supply current	407	453	525	mA
P_{tot}	total power dissipation	1.2	1.4	1.9	W
f_{DCXO}	quartz frequency (digital controlled tuning)	$27 \times (1 - 200 \times 10^{-6})$	27	$27 \times (1 + 200 \times 10^{-6})$	MHz
f_{SDRAM}	SDRAM clock frequency	–	108	–	MHz
f_{SCL}	I²C-bus input clock frequency	100	–	400	kHz
B	output bit-rate	1.5	–	25	Mbit/s
V_{IH}	HIGH-level digital input voltage	1.7	–	3.6	V
V_{IL}	LOW-level digital input voltage	−0.5	–	+0.7	V
V_{OH}	HIGH-level digital output voltage	$V_{DDP} - 0.4$	–	V_{DDP}	V
V_{OL}	LOW-level digital output voltage	0	–	0.4	V
T_{amb}	ambient temperature	0	–	70	°C

4 ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
SAA6752HS/01[1]	SQFP208	plastic shrink quad ?at package; 208 leads (lead length 1.3 mm); body 28 × 28 × 3.4 mm; high stand-off height	SOT316-1
SAA6752HS/02[2]			

Notes

1. MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer.
2. MPEG-2 video and MPEG-audio encoder with multiplexer, but without AC-3 audio encoder.

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer SAA6752HS

5 BLOCK DIAGRAM

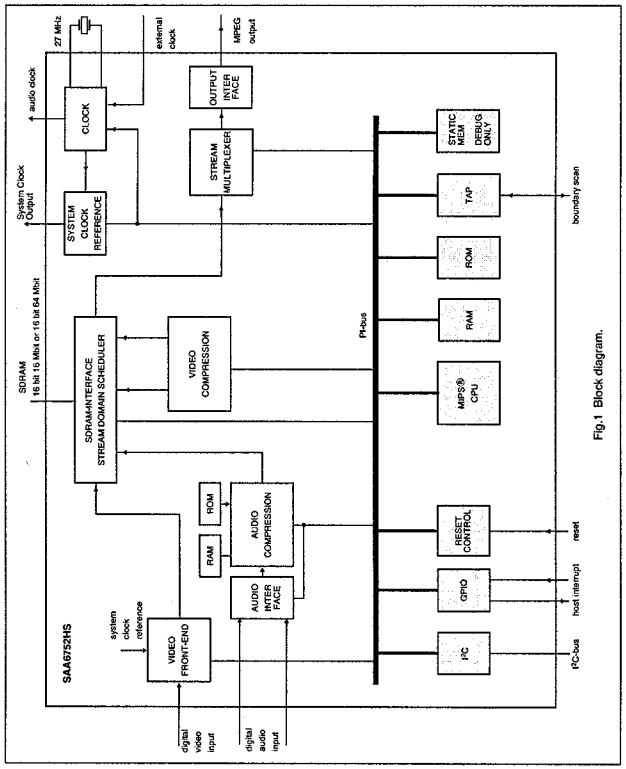


Fig.1 Block diagram.

6 PINNING

SYMBOL	PIN	INPUT/OUTPUT[1]	I_{max} (mA)	DESCRIPTION
V_{SSP}	1	ground	–	pad ground
SDATA1	2	input	–	I²S-bus serial data input port 1 with internal pull-down resistor
SCLK1	3	input/output	4	I²S-bus serial clock port 1 with internal pull-down resistor
SWS1	4	input/output	4	I²S-bus word select port 1 with internal pull-down resistor
V_{DDP}	5	supply	–	pad ring supply voltage (3.3 V)
SDATA2	6	input/output	4	I²S-bus serial data port 2 with internal pull-down resistor
SCLK2	7	input/output	4	I²S-bus serial clock port 2 with internal pull-down resistor
SWS2	8	input/output	4	I²S-bus word select port 2 with internal pull-down resistor
ACLK	9	output	4	audio clock output (256 × f_s or 384 × f_s)
V_{SSP}	10	ground	–	pad ground
IDQ	11	input	–	reserved (recommended connect to pin V_{SSP}) with internal pull-down resistor
YUV0	12	input	–	video input signal bit 0 (LSB)
YUV1	13	input	–	video input signal bit 1
YUV2	14	input	–	video input signal bit 2
YUV3	15	input	–	video input signal bit 3
YUV4	16	input	–	video input signal bit 4
YUV5	17	input	–	video input signal bit 5
YUV6	18	input	–	video input signal bit 6
YUV7	19	input	–	video input signal bit 7 (MSB)
V_{SSP}	20	ground	–	pad ground
HSYNC	21	input	–	horizontal sync input (video) with internal pull-down resistor
VSYNC	22	input	–	vertical sync input (video) with internal pull-down resistor
FID	23	input	–	video ?eld identi?cation input (odd/even ?eld) with internal pull-down resistor
VCLK1	24	input	–	video clock input 1 (27 MHz) with internal pull-down resistor
V_{SSCO}	25	ground	–	core ground
V_{SSCO}	26	ground	–	core ground
V_{DDCO}	27	supply	–	core supply voltage (2.5 V)
V_{DDCO}	28	supply	–	core supply voltage (2.5 V)
V_{DDP}	29	supply	–	pad ring supply voltage (3.3 V)
VCLK2	30	input	–	video clock input 2 (27 MHz) with internal pull-down resistor
PDOAV	31	3-state output	4	parallel stream data output for audio/video identi?er
PDIDS	32	input	–	parallel stream data input for data strobe (request for packet in Data Expansion Bus Interface (DEBI) slave mode) with internal pull-up resistor
PDOSYNC	33	3-state output	4	parallel stream data output for packet sync
V_{SSP}	34	ground	–	pad ground
PDOVAL	35	3-state output	4	parallel stream data valid output with internal pull-up resistor
PDO0	36	3-state output	4	parallel stream data output bit 0 (LSB)

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer SAA6752HS

SYMBOL	PIN	INPUT/OUTPUT[1]	I_{max} (mA)	DESCRIPTION
PDO1	37	3-state output	4	parallel stream data output bit 1
PDO2	38	3-state output	4	parallel stream data output bit 2
V_{DDP}	39	supply	–	pad ring supply voltage (3.3 V)
PDO3	40	3-state output	4	parallel stream data output bit 3
PDO4	41	3-state output	4	parallel stream data output bit 4
PDO5	42	3-state output	4	parallel stream data output bit 5
PDO6	43	3-state output	4	parallel stream data output bit 6
V_{SSP}	44	ground	–	pad ground
PDO7	45	3-state output	4	parallel stream data output bit 7 (MSB)
PDIOCLK	46	input/output	4	parallel stream clock input/output
I2CADDRSEL	47	input	–	I²C-bus address select input with internal pull-up resistor
SD_DQ15	48	input/output	8	SDRAM data input/output bit 15 (MSB)
V_{DDP}	49	supply	–	pad ring supply voltage (3.3 V)
SD_DQ0	50	input/output	8	SDRAM data input/output bit 0 (LSB)
SD_DQ14	51	input/output	8	SDRAM data input/output bit 14
SD_DQ1	52	input/output	8	SDRAM data input/output bit 1
V_{SSP}	53	ground	–	pad ground
SD_DQ13	54	input/output	8	SDRAM data input/output bit 13
SD_DQ2	55	input/output	8	SDRAM data input/output bit 2
SD_DQ12	56	input/output	8	SDRAM data input/output bit 12
V_{DDP}	57	supply	–	pad ring supply voltage (3.3 V)
SD_DQ3	58	input/output	8	SDRAM data input/output bit 3
SD_DQ11	59	input/output	8	SDRAM data input/output bit 11
SD_DQ4	60	input/output	8	SDRAM data input/output bit 4
SD_DQ10	61	input/output	8	SDRAM data input/output bit 10
V_{SSP}	62	ground	–	pad ground
SD_DQ5	63	input/output	8	SDRAM data input/output bit 5
SD_DQ9	64	input/output	8	SDRAM data input/output bit 9
SD_DQ6	65	input/output	8	SDRAM data input/output bit 6
SD_DQ8	66	input/output	8	SDRAM data input/output bit 8
V_{DDP}	67	supply	–	pad ring supply voltage (3.3 V)
SD_DQ7	68	input/output	8	SDRAM data input/output bit 7
SD_DQM1	69	output	8	SDRAM data mask enable output bit 1
SD_DQM0	70	output	8	SDRAM data mask enable output bit 0 (LSB)
$\overline{SD\_WE}$	71	output	8	SDRAM write enable output (active LOW)
V_{SSP}	72	ground	–	pad ground
$\overline{SD\_CAS}$	73	output	8	SDRAM column address strobe output (active LOW)
SD_CLK	74	output	8	SDRAM clock output
$\overline{SD\_RAS}$	75	output	8	SDRAM row address strobe output (active LOW)
SD_CKE	76	output	8	SDRAM clock enable output

SYMBOL	PIN	INPUT/OUTPUT[1]	I_{max} (mA)	DESCRIPTION
V_{SSCO}	77	ground	–	core ground
V_{SSCO}	78	ground	–	core and substrate ground
V_{DDCO}	79	supply	–	core supply voltage (2.5 V)
V_{DDCO}	80	supply	–	core supply voltage (2.5 V)
V_{DDP}	81	supply	–	pad ring supply voltage (3.3 V)
SD_CS	82	output	8	SDRAM chip select output (active LOW)
SD_A13	83	output	8	SDRAM address output bit 13 (bank selection for 64 Mbit)
SD_A9	84	output	8	SDRAM address output bit 9
SD_A8	85	output	8	SDRAM address output bit 8
V_{SSP}	86	ground	–	pad ground
SD_A11	87	output	8	SDRAM address output bit 11 (bank selection for 16 Mbit)
SD_A7	88	output	8	SDRAM address output bit 7
SD_A12	89	output	8	SDRAM address output bit 12 (bank selection for 64 Mbit)
SD_A6	90	output	8	SDRAM address output bit 6
V_{DDP}	91	supply	–	pad ring supply voltage (3.3 V)
SD_A10	92	output	8	SDRAM address output bit 10
SD_A5	93	output	8	SDRAM address output bit 5
SD_A0	94	output	8	SDRAM address output bit 0 (LSB)
SD_A4	95	output	8	SDRAM address output bit 4
V_{SSP}	96	ground	–	pad ground
SD_A1	97	output	8	SDRAM address output bit 1
SD_A3	98	output	8	SDRAM address output bit 3
SD_A2	99	output	8	SDRAM address output bit 2
SD_DQM3	100	output	8	reserved (do not connect)
V_{DDP}	101	supply	–	pad ring supply voltage (3.3 V)
SD_DQM2	102	output	8	reserved (do not connect)
SD_DQ31	103	input/output	8	reserved (do not connect)
SD_DQ16	104	input/output	8	reserved (do not connect)
V_{SSP}	105	ground	–	pad ground
SD_DQ30	106	input/output	8	reserved (do not connect)
SD_DQ17	107	input/output	8	reserved (do not connect)
SD_DQ29	108	input/output	8	reserved (do not connect)
V_{DDP}	109	supply	–	pad ring supply voltage (3.3 V)
SD_DQ18	110	input/output	8	reserved (do not connect)
SD_DQ28	111	input/output	8	reserved (do not connect)
SD_DQ19	112	input/output	8	reserved (do not connect)
SD_DQ27	113	input/output	8	reserved (do not connect)
V_{SSP}	114	ground	–	pad ground
SD_DQ20	115	input/output	8	reserved (do not connect)
SD_DQ26	116	input/output	8	reserved (do not connect)

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer SAA6752HS

SYMBOL	PIN	INPUT/OUTPUT[1]	I_{max} (mA)	DESCRIPTION
V_{SSCO}	77	ground	–	core ground
V_{SSCO}	78	ground	–	core and substrate ground
V_{DDCO}	79	supply	–	core supply voltage (2.5 V)
V_{DDCO}	80	supply	–	core supply voltage (2.5 V)
V_{DDP}	81	supply	–	pad ring supply voltage (3.3 V)
SD_CS	82	output	8	SDRAM chip select output (active LOW)
SD_A13	83	output	8	SDRAM address output bit 13 (bank selection for 64 Mbit)
SD_A9	84	output	8	SDRAM address output bit 9
SD_A8	85	output	8	SDRAM address output bit 8
V_{SSP}	86	ground	–	pad ground
SD_A11	87	output	8	SDRAM address output bit 11 (bank selection for 16 Mbit)
SD_A7	88	output	8	SDRAM address output bit 7
SD_A12	89	output	8	SDRAM address output bit 12 (bank selection for 64 Mbit)
SD_A6	90	output	8	SDRAM address output bit 6
V_{DDP}	91	supply	–	pad ring supply voltage (3.3 V)
SD_A10	92	output	8	SDRAM address output bit 10
SD_A5	93	output	8	SDRAM address output bit 5
SD_A0	94	output	8	SDRAM address output bit 0 (LSB)
SD_A4	95	output	8	SDRAM address output bit 4
V_{SSP}	96	ground	–	pad ground
SD_A1	97	output	8	SDRAM address output bit 1
SD_A3	98	output	8	SDRAM address output bit 3
SD_A2	99	output	8	SDRAM address output bit 2
SD_DQM3	100	output	8	reserved (do not connect)
V_{DDP}	101	supply	–	pad ring supply voltage (3.3 V)
SD_DQM2	102	output	8	reserved (do not connect)
SD_DQ31	103	input/output	8	reserved (do not connect)
SD_DQ16	104	input/output	8	reserved (do not connect)
V_{SSP}	105	ground	–	pad ground
SD_DQ30	106	input/output	8	reserved (do not connect)
SD_DQ17	107	input/output	8	reserved (do not connect)
SD_DQ29	108	input/output	8	reserved (do not connect)
V_{DDP}	109	supply	–	pad ring supply voltage (3.3 V)
SD_DQ18	110	input/output	8	reserved (do not connect)
SD_DQ28	111	input/output	8	reserved (do not connect)
SD_DQ19	112	input/output	8	reserved (do not connect)
SD_DQ27	113	input/output	8	reserved (do not connect)
V_{SSP}	114	ground	–	pad ground
SD_DQ20	115	input/output	8	reserved (do not connect)
SD_DQ26	116	input/output	8	reserved (do not connect)

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer SAA6752HS

SYMBOL	PIN	INPUT/OUTPUT[1]	I_{max} (mA)	DESCRIPTION
SD_DQ21	117	input/output	8	reserved (do not connect)
SD_DQ25	118	input/output	8	reserved (do not connect)
V_{DDP}	119	supply	–	pad ring supply voltage (3.3 V)
SD_DQ22	120	input/output	8	reserved (do not connect)
SD_DQ24	121	input/output	8	reserved (do not connect)
SD_DQ23	122	input/output	8	reserved (do not connect)
EXTCLK	123	input	–	27 MHz external clock input with internal pull-up resistor
V_{SSP}	124	ground	–	pad ground
V_{SSA}	125	ground	–	oscillator analog ground
XTALI	126	analog input	–	crystal oscillator input (27 MHz); note 2
XTALO	127	analog output	–	crystal oscillator output (27 MHz)
V_{DDA}	128	supply	–	oscillator analog supply voltage (2.5 V)
V_{SSCO}	129	ground	–	core ground
V_{SSCO}	130	ground	–	core ground
V_{DDCO}	131	supply	–	core supply voltage (2.5 V)
V_{DDCO}	132	supply	–	core supply voltage (2.5 V)
V_{DDP}	133	supply	–	pad ring supply voltage (3.3 V)
TDI	134	input	–	boundary scan test data input; pin must ?oat or set to HIGH during normal operating; with internal pull-up resistor; note 3
TMS	135	input	–	boundary scan test mode select; pin must ?oat or set to HIGH during normal operating; with internal pull-up resistor; note 3
TCK	136	input	–	boundary scan test clock; pin must be set to LOW during normal operating; with internal pull-up resistor; note 3
TDO	137	3-state output	4	boundary scan test data output; pin not active during normal operating; with 3-state output; note 3
V_{SSP}	138	ground	–	pad ground
$\overline{TRST}$	139	input	–	test reset input (active LOW), for boundary scan test (with internal pull-up); notes 3 and 4
CLKOUT	140	output	4	27 MHz system clock output
TEST0	141	input/output	4	reserved (do not connect)
TEST1	142	input/output	4	reserved (do not connect)
V_{DDP}	143	supply	–	pad ring supply voltage (3.3 V)
TEST2	144	input/output	4	reserved (do not connect)
SDA	145	input/open-drain output	–	serial data input/output (I^2C-bus)
SCL	146	input/open-drain output	–	serial clock input/output (I^2C-bus)
$\overline{RESET}$	147	input	–	reset input (active LOW); with internal pull-up resistor
V_{SSP}	148	ground	–	pad ground
$\overline{RTS}$	149	output	4	reserved (do not connect); Universal Asynchronous Receiver/Transmitter (UART) request to send output (active LOW)

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer SAA6752HS

SYMBOL	PIN	INPUT/OUTPUT[1]	I_{max} (mA)	DESCRIPTION
$\overline{CTS}$	150	input	–	reserved (recommended connect to pin V_{DDP}); UART clear to send input; external static memory select input (active LOW); with internal pull-up resistor
RXD	151	input	–	reserved (recommended connect to pin V_{DDP}); UART receive data; internal boot select input; with internal pull-up resistor
TXD	152	output	4	reserved (do not connect); UART transmit data
V_{DDP}	153	supply	–	pad ring supply voltage (3.3 V)
$\overline{SM\_LB}$	154	input/output	4	reserved (do not connect)
$\overline{SM\_UB}$	155	input/output	4	reserved (do not connect)
H_IRF	156	3-state output	4	host interrupt ?ag output; with internal pull-up resistor
V_{SSP}	157	ground	–	pad ground
$\overline{SM\_OE}$	158	output	4	reserved (do not connect), static memory output enable output (active LOW)
SM_A9	159	output	4	reserved (do not connect), static memory address output bit 9
SM_A10	160	output	4	reserved (do not connect), static memory address output bit 10
V_{DDP}	161	supply	–	pad ring supply voltage (3.3 V)
SM_A8	162	output	4	reserved (do not connect), static memory address output bit 8
SM_A11	163	output	4	reserved (do not connect), static memory address output bit 11
SM_A7	164	output	4	reserved (do not connect), static memory address output bit 7
SM_A12	165	output	4	reserved (do not connect), static memory address output bit 12
V_{SSP}	166	ground	–	pad ground
SM_A6	167	output	4	reserved (do not connect), static memory address output bit 6
SM_A13	168	output	4	reserved (do not connect), static memory address output bit 13
SM_A5	169	output	4	reserved (do not connect), static memory address output bit 5
SM_A14	170	output	4	reserved (do not connect), static memory address output bit 14
V_{DDP}	171	supply	–	pad ring supply voltage (3.3 V)
$\overline{SM\_WE}$	172	output	4	reserved (do not connect), static memory write enable output (active LOW)
SM_D7	173	input/output	4	reserved (do not connect), static memory data input/output bit 7 with internal pull-down resistor
SM_D8	174	input/output	4	reserved (do not connect), static memory data input/output bit 8 with internal pull-down resistor
SM_D6	175	input/output	4	reserved (do not connect), static memory data input/output bit 6 with internal pull-down resistor
V_{SSP}	176	ground	–	pad ground
SM_D9	177	input/output	4	reserved (do not connect), static memory data input/output bit 9 with internal pull-down resistor
SM_D5	178	input/output	4	reserved (do not connect), static memory data input/output bit 5 with internal pull-down resistor
SM_D10	179	input/output	4	reserved (do not connect), static memory data input/output bit 10 with internal pull-down resistor

MPEG-2 video and MPEG-audio/AC-3 audio encoder with multiplexer SAA6752HS

SYMBOL	PIN	INPUT/OUTPUT[1]	I_{max} (mA)	DESCRIPTION
SM_D4	180	input/output	4	reserved (do not connect), static memory data input/output bit 4 with internal pull-down resistor
V_{SSCO}	181	ground	–	internal pre-driver and substrate ground
V_{SSCO}	182	ground	–	core ground
V_{DDCO}	183	supply	–	core supply voltage (2.5 V)
V_{DDCO}	184	supply	–	internal pre-driver supply voltage (2.5 V)
V_{DDP}	185	supply	–	pad ring supply voltage (3.3 V)
SM_D11	186	input/output	4	reserved (do not connect), static memory data input/output bit 11 with internal pull-down resistor
SM_D3	187	input/output	4	reserved (do not connect), static memory data input/output bit 3 with internal pull-down resistor
SM_D12	188	input/output	4	reserved (do not connect), static memory data input/output bit 12 with internal pull-down resistor
SM_D2	189	input/output	4	reserved (do not connect), static memory data input/output bit 2 with internal pull-down resistor
V_{SSP}	190	ground	–	pad ground
SM_D13	191	input/output	4	reserved (do not connect), static memory data input/output bit 13 with internal pull-down resistor
SM_D1	192	input/output	4	reserved (do not connect), static memory data input/output bit 1 with internal pull-down resistor
SM_D14	193	input/output	4	reserved (do not connect), static memory data input/output bit 14 with internal pull-down resistor
SM_D0	194	input/output	4	reserved (do not connect), static memory data input/output bit 0 (LSB) with internal pull-down resistor
V_{DDP}	195	supply	–	pad ring supply voltage (3.3 V)
SM_D15	196	input/output	4	reserved (do not connect), static memory data input/output bit 15 (MSB) with internal pull-down resistor
$\overline{SM\_CS3}$	197	output	4	reserved (do not connect), static memory chip select output for external ROM or RAM (active LOW)
SM_A4	198	output	4	reserved (do not connect), static memory address output bit 4
SM_A3	199	output	4	reserved (do not connect), static memory address output bit 3
V_{SSP}	200	ground	–	pad ground
SM_A2	201	output	4	reserved (do not connect), static memory address output bit 2
SM_A15	202	output	4	reserved (do not connect), static memory address output bit 15
SM_A1	203	output	4	reserved (do not connect), static memory address output bit 1
SM_A16	204	output	4	reserved (do not connect), static memory address output bit 16
V_{DDP}	205	supply	–	pad ring supply voltage (3.3 V)
SM_A0	206	output	4	reserved (do not connect), static memory address output bit 0 (LSB)
SM_A17	207	output	4	reserved (do not connect), static memory address output bit 17 (MSB)
$\overline{SM\_CS0}$	208	output	4	reserved (do not connect)

IC7700:FLI2200

FLI2200

Description

The FLI2200 is a single chip implementation of Faroudja Laboratories' award winning deinterlacing and post-processing algorithms that produce the highest quality progressive video output from a variety of interlaced video inputs including 525/60 (NTSC) or 625/50 (PAL or SECAM). It uses patented and patent pending motion-adaptive deinterlacing that selects the optimal filtering on a per-pixel basis. This includes detection and proper interleaving of 3:2 and 2:2 pulldown for film-base sources, including continuous monitoring and compensation for bad edits that occur frequently in broadcast material due to poor scene cuts or insertion of commercials. Video material is processed by a set of content-sensitive spatio-temporal filters that adapt to the appropriate direction for smoothest interpolation using the patented Faroudja DCDi™ algorithm. The FLI2200 also includes motion-adaptive cross-color suppression that removes highly objectionable coloration artifacts produced by commonly used video decoders. Its internal processing uses 10 bits per channel to maintain the highest quality. Its inputs and outputs are 10 bits/channel for best quality but also supports 8 bits/channel for more cost-sensitive applications. The FLI2200 requires 4 MB of low cost SDRAM for best quality deinterlacing, but it can also be operated in an optimized intra-field mode without memory for more cost-sensitive applications. This makes possible the use of a single design for both high-end and low-end applications.

The FLI2200 integrates a number of functions to provide maximum flexibility in a low cost configuration. This includes an on-chip clock generator, SDRAM controller, display controller, input and output color-space converters. It uses a standard 2-wire serial control interface for easy control and access to the registers.

The FLI2200 can be connected without glue logic to the FLI2000 video decoder and FLI2220 Enhancer and OSD Generator to produce the highest quality video pipeline for premium applications. It is also fully compatible with other decoders having a ITU-R BT 656 output format.

Applications

Flat panel TV – LCD, PDP

Progressive scan TVs

Multimedia front/rear projectors

Home Theater

Scan Converters

Multimedia PCs/Workstations

DCDi™ is a Faroudja trademark

Features

Motion-adaptive cross-color suppression removes artifacts produced by improper Y/C separation in low-cost video decoders

Motion-adaptive video deinterlacing selects optimal filtering on a per-pixel basis

- Film-mode for proper handling of 3:2 and 2:2 pulldown material
- Bad-edit detection/correction compensates for poor scene cuts and insertions common in broadcast material
- Motion-weighted interpolation for video sources produces maximum resolution without introducing motion artifacts
- Directional Correlational Deinterlacing (DCDi™) minimizes jaggies on angled lines

8/10-bit Y/Cb/Cr (D1) (ITU-R BT 656), 16/20-bit Y Cb/Cr (ITU-R BT 601), 24/30-bit RGB or YCbCr/YPbPr interlaced input options

- Supports 525/60 (NTSC), 625/50 (PAL/SECAM)
- Accepts up to 1100 pixels/line

8/10-bit, 16/20-bit YUV, 24/30-bit RGB or YCbCr/YPbPr progressive output options

Supports 8- or 10-bit inputs and outputs

10-bit internal processing for highest quality

Includes color-space converters at input and output for maximum flexibility

Auto-detection of NTSC/PAL/SECAM inputs

High-order filtering produces smooth chroma output in 4:2:2 to 4:4:4 or 4:4:4 to 4:2:2 conversions

Resolution recovery maximizes output signal-to-noise ratio and dynamic range

Can be operated without glue logic with FLI2000 Video Decoder and FLI2220 Enhancer and OSD Generator ICs to produce highest quality video pipeline

Glue-less interface to most standard video decoders

Built-in display timing generator

On-chip clock generator eliminates external PLLs

On-chip SDRAM controller

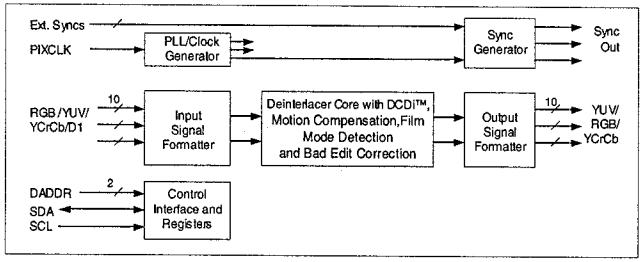
Uses low cost SDRAM as field memory – 4 MB

Optimized intra-field operation allows memory-less configuration for lowest cost applications with same design and layout as for high-end applications

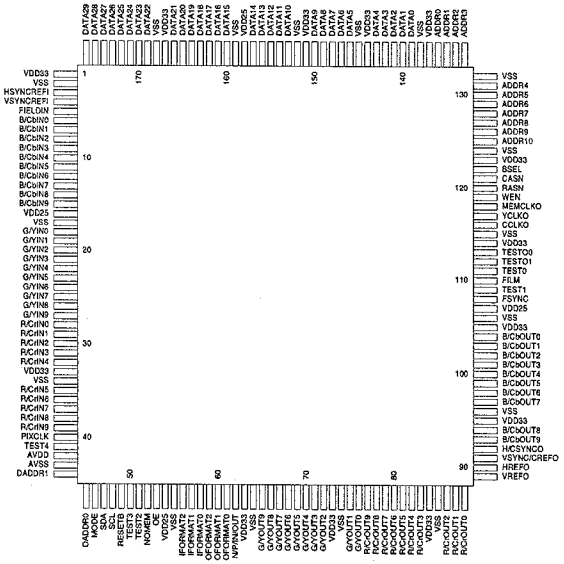
2-wire serial control interface for easy control

176-pin TQFP package

Simplified Block Diagram



Pin description



Pin #	Name	Description
52	NOMEM	No Memory Mode control input. This pin controls the operation of the FLI2200 as follows: When this pin is set low the device is used with external field memories and operates in the full set of deinterlacing modes, i.e., motion adaptive video deinterlacing and full frame film source deinterlacing using 3:2 pulldown detection (2:2 pulldown for 625/50 sources). When this pin is set high the FLI2200 is forced into the intra-field only deinterlacing mode, which requires no external memories, allowing the FLI2200 to be used in low-cost applications where the ultimate video quality is not a requirement. ***To ensure proper startup of the SDRAMs this pin should be set high during the power-up sequence.*** This can be overridden by the NMOvr bit, bit 1 in register 05_H, allowing this function to be set or changed via the I²C bus. Please refer to the description of register 05_H for details.
27-18	G/YIN_{9-0}	10-bit green or luminance signal input bus. The mode is set by the $IFORMAT_{2-0}$ pins. This can be overridden by the IFmtOvr bit, bit 3 in register 00_H, allowing this function to be set or changed via the I²C bus. Please refer to the description of register 00_H for details. This signal is sampled on the rising edge of PIXCLK.
15-6	$B/CbIN_{9-0}$	10-bit blue or Cb chroma signal input bus. The mode is set by the $IFORMAT_{2-0}$ pins. This can be overridden by the IFmtOvr bit, bit 3 in register 00_H, allowing this function to be set or changed via the I²C bus. Please refer to the description of register 00_H for details. Bits 6, 4 and 3 in register 08_H specify the busses used in the multiplexed modes. In all cases the signals are sampled on the rising edges of PIXCLK. In the Y Cb Cr and Y Pb Pr modes the Cb or Pb signal is sampled on alternate rising edges of PIXCLK in 4:2:2 mode. The frequency of PIXCLK will be 27 MHz in the multiplexed Y/Cb/Cr mode and 13.5 MHz in all other modes. These pins should be tied low when not used.
39-35 32-28	$R/CrIN_{9-0}$	10-bit red or Cr chroma signal input bus. The mode is set by the $IFORMAT_{2-0}$ pins. This can be overridden by the IFmtOvr bit, bit 3 in register 00_H, allowing this function to be set or changed via the I²C bus. Please refer to the description of register 00_H for details. Bits 6, 4 and 3 in register 08_H specify the busses used in the multiplexed modes. In all cases the signals are sampled on the rising edges of PIXCLK. In the Y Cb Cr mode the Cr signal is sampled on alternate rising edges of PIXCLK in 4:2:2 mode. The frequency of PIXCLK will be 27 MHz in the multiplexed Y/Cb/Cr mode and 13.5 MHz in all other modes. These pins should be tied low when not used.
3	HSYNCREFI	Horizontal sync or reference. The horizontal sync or reference of the input signal should be connected to this pin. The function is programmed with bit 4 in register 00_H. The polarity and position of the sync or reference pulse relative to the start of active video are both programmable within a small range. When the FLI2200 is used in the ITU-R BT 601/D1 input mode with embedded syncs (IFormat = 110) this input is not used and should be tied low; in this case all sync information will be derived from the signal.
4	VSYNCREFI	Vertical sync or reference. The vertical sync or reference of the input signal should be connected to this pin. The function is programmed with bit 4 in register 00_H. The polarity and position of the sync or reference pulse relative to the start of active video are both programmable within a small range. When the FLI2200 is used in the ITU-R BT 601/D1 input mode with embedded syncs (IFormat = 110) this input is not used and should be tied low; in this case all sync information will be derived from the signal.
5	FLDIN	Field identifier input. The field identifier output of the source signal should be connected to this pin. A low setting signifies an even field and a high level signifies an odd field. When bit 4 in register 00_H is set low, the input timing is based on HREF and VREF and this signal is required. When this bit is set high the input timing is based on HSYNC and VSYNC and this signal is generated internally and is not required. When bit 5 in register 06 is set high this signal is also used as the frame boundary identifier for 30 Hz film sources.

Pin Connections and Functions

Pin #	Name	Description
See list	V_{SS}	Ground connections. Connect to the digital ground plane. Pins: 2, 17, 34, 55, 64, 74, 85, 96, 106, 115, 124, 132, 138, 145, 152, 159, 168
See list	V_{DD33}	Pad Ring digital power connections. Connect to the digital 3.3 volt power supply and decouple to the digital ground plane. Pins: 1, 33, 63, 73, 84, 95, 105, 114, 123, 137, 144, 151, 167
See list	V_{DD25}	Core Logic digital power connections. Connect to the digital 2.5 volt power supply and decouple to the digital ground plane. Pins: 16, 54, 107, 158
43	AV_{SS}	Ground connection for the clock PLL circuits. Connect to the digital ground plane
42	AV_{DD}	Analog power connections for the clock PLL circuit. Connect to a separately decoupled 2.5 volt power supply and decouple directly to the AV_{SS} pin..
49	RESETB	Reset. When this input is set low it will reset all the internal registers to the default states. Refer to the section on the control registers for details of these states. The device must be reset after it is powered-up.
53	OE	When this pin is set high the outputs of the FLI2200 will be enabled; when it is set low the outputs will be set into a high-impedance state.
56-58	$IFORMAT_{2-0}$	Input signal format control. The settings of these pins set the format of the input signal. This can be overridden by the IFmtOvr bit, bit 3 in register 00_H, allowing this function to be set or changed via the I^2C bus. Please refer to the description of register 00_H for details.
59-61	$OFORMAT_{2-0}$	Output signal format control. The settings of these pins set the format of the output signal. This can be overridden by the OFmtOvr bit, bit 3 in register 07_H, allowing this function to be set or changed via the I^2C bus. Please refer to the description of register 07_H for details.
44-45	$DADDR_{1-0}$	The settings of $DADDR_{1-0}$ allow the device address of the control bus to be programmed to prevent conflict with the other devices connected to the bus. $DADDR_{1-0}$ allow the device address to be set to any of the following values: $C0/C1_H$, $C2/C3_H$, $E0/E1_H$, $E2/E3_H$. Please refer to the section "Control Bus Operation and Protocol" for further information.
46	MODE	When this pin is set low the control bus will operate in the slave mode; allowing the device to programmed from an external controllor. When it is set high the FLI2200 will self-program from an external I^2C memory connected to the bus. Please refer to the "Control Bus Operation and Control Protocol" section for more details.
47	SDA	2-wire serial control bus data. Data can be written to the control registers via this pin when it is in the input mode and data can be read from the status registers when it is in the output mode. Refer to the section on the serial port for timing and format details and to the section on the registers for programming information.
48	SCL	2-wire serial control bus clock. When the control port operates in slave mode this pin will be an input and when it operates in the self programming mode it will be an output.
40	PIXCLK	Pixel clock input. This clock is used to drive all the circuits in the FLI2200. An internal PLL is used to upconvert this clock to provide the master clock signal and other clocks used internally. Note that when the FLI2200 is used in the D1 input mode the PIXCLK input should run at the rate of two cycles per pixel (one for luma and one for chroma).
62	N/P/IN/OUT	NTSC/PAL input or output. The default function of this pin is NTSC/PAL signal indicator output. When the input video signal is a 525 line signal this pin will be set high and when it is a 625 line signal the pin is set low. This function of this pin can be programmed to be an input according to the setting of this pin if the $NPOp_{1-0}$ bits, bits 5-4 in register 03_H, are set to 00_H, overriding the internal line counter. i.e., it will treat the signal as a 525 line signal when it is set high and a 625 line signal when it is set low.

Pin #	Name	Description
65-72 75-76	$G/YOUT_{9-0}$	Green or luminance output bus. In the RGB mode this output is the Green signal and in the YCbCr mode it is the Y signal. The mode is set by the $OFORMAT_{2-0}$ pins. This can be overridden by the OFmtOvr bit, bit 3 in register 07_H, allowing this function to be set or changed via the I^2C bus. Please refer to the description of register 07_H for details. The signal is clocked out on the falling edge of YCLKO.
93-94 97-104	$B/CbOUT_{9-0}$	Blue or Cb chrominance output bus. In the RGB mode this output is the Blue signal, in the Y Cb Cr mode it is the Cb signal. The mode is set by the $OFORMAT_{2-0}$ pins. This can be overridden by the OFmtOvr bit, bit 3 in register 07_H, allowing this function to be set or changed via the I^2C bus. Please refer to the description of register 07_H for details. The busses used in the multiplexed modes are set by means of bit 5 in register 08_H. The signal is clocked out on the falling edge of YCLKO in the RGB and YUV 4:4:4 modes, on the falling edge of YCLKO prior to the next rising edge of CCLKO in the YUV 4:2:2 mode, and on the rising edge of MEMCLKO in the multiplexed YCbCr (pseudo D1) mode.
77-83 86-88	$R/CrOUT_{9-0}$	Red or Cr chrominance output bus. In the RGB mode this output is the Red signal, in the YCbCr mode it is the Cr signal. The mode is set by the $OFORMAT_{2-0}$ pins. This can be overridden by the OFmtOvr bit, bit 3 in register 07_H, allowing this function to be set or changed via the I^2C bus. Please refer to the description of register 07_H for details. The busses used in the multiplexed modes are set by means of bit 5 in register 08_H. The signal is clocked out on the falling edge of YCLKO in the RGB and YUV 4:4:4 modes, on the falling edge of YCLKO prior to the next rising edge of CCLKO in the YUV 4:2:2 mode, and on the rising edge of MEMCLKO in the multiplexed YCbCr (pseudo D1) mode.
116	CCLKO	Chroma output sampling clock. This clock is derived from PIXCLK and will be at half the frequency of YCLKO. In 30-bit 4:2:2 output mode the chroma output signals will change on the falling edge of YCLKO prior to the next rising edge this clock.
117	YCLKO	Luma output sampling clock. This clock is derived from PIXCLK and is double the frequency of PIXCLK. In 30-bit and 20-bit output modes the output signals will change on the falling edge of this clock.
89	VREFO	Start of active field or frame indicator. This signal goes high to indicate the first active line in each field or frame and goes low during the vertical blanking interval. The polarity and timing of this signal are programmable.
90	HREFO	Start of active line indicator output. This signal goes high to indicate the first active pixel in each line and goes low during the horizontal blanking interval. The polarity and timing of this signal are programmable.
91	VSYNC/ CREFO	Vertical sync output. This signal provides the vertical sync function for the outputs. Its polarity is programmable to be active high or active low. It can also be programmed to be a composite reference for applications requiring this instead of sync.
92	H/CSYNCO	Horizontal or composite sync output. This signal provides the horizontal sync function for the outputs. Its polarity is programmable to be active high or active low. This signal can also be programmed to be the composite sync output, CSYNC.
108	FSYNC	Film mode sync output. When film mode is detected this pin will toggle in sync with the 3:2 (NTSC) or 2:2 (PAL and 30 Hz film in NTSC) pulldown sequence detected in the source.
110	FILM	Film mode detector output. This pin will be set high when the FLI2200 detects that the video input was converted from 24 fps film with a teleciné machine. If film mode is not detected this pin will be set low.

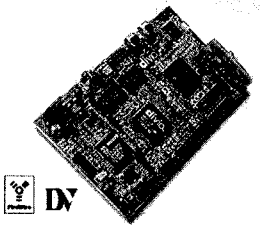
Pin #	Name	Description
125-131 133-136	$ADDR_{10-0}$	SDRAM Address bus. This signal bus is used to address the external SDRAM(s) used for field memories. It should be connected to the A_{10-0} bus of the memory chip(s). Please refer to the Applications section of this data sheet for further details.
176-169 166-160 157-153 150-146 143-139	$DATA_{29-0}$	SDRAM Data bus. This signal bus is used to transfer the data to and from the external SDRAM(s) used for field memories. It should be connected to the DQ_{29-0} bus of the memory chip when using a 64 Mbit SDRAM. When using two 16 Mbit SDRAMs this 30-bit bus may be connected to the two 16-bit data busses of the memories in two ways: either connect 16 lines to one chip and 14 to the other, or connect 15 to both. In all cases the two unused data lines on the memory chip(s) should be connected to ground via 22 k? resistors. Please refer to the Applications section of this data sheet for further details.
118	MEMCLKO	SDRAM clock and 2x output sampling clock. This clock is derived from PIXCLK and will be at double the frequency of YCLKO. This active signal should be connected to the CLK pin(s) on the SDRAM(s). When the 10-bit output mode selected the output signals will also change at this clock rate and this should then be used as the output clock..
119	WEN	SDRAM Write Enable. This active low signal should be connected to the WE pin(s) on the SDRAM(s).
120	RASN	SDRAM Row Address Select. This active low signal should be connected to the RAS pin(s) on the SDRAM(s).
121	CASN	SDRAM Column Address Select. This active low signal should be connected to the CAS pin(s) on the SDRAM(s).
122	BSEL	SDRAM Bank Select. When using two 16 Mbit SDRAMs this signal should be connected to the BA (also called BS or A_{11}) pin on both SDRAMs. When using a 64 Mbit SDRAM this signal should be connected to the BA0 (also called BS0 or A_{11}) pin on the SDRAM and BA1/ BS1 (also called BA when BA0 is referred to as A_{11}) should be tied low.
41, 50, 51, 109, 111	$TEST_{4-0}$	These pins are used for test purposes only and should always be tied low for normal operation.
112, 113	$TESTO_{1-0}$	These pins are test outputs and should be left unconnected in normal operation.

9.11 IC's Divio Board

9.11.1 IC7404: NW700

divio

NW700
DV Decoder
Daytona Beach
Reference Solution



divio NW700 DV Decoder Daytona Beach Reference Solution

divio introduces the NW700, the world's first single-chip DV decoder. Fully DV-SD compliant and designed with divio's patented pending compression technology, the NW700 delivers unrivaled video quality, performance and compatibility. With a single-chip design and glueless interface to standard video components, divio's single chip DV decoder will replace current multi-chip solution and enable a new generation of cost-effective digital video consumer products.

divio has created the "Daytona Beach" reference solution that includes the NW700, Philips Semiconductor's PDI1394L4X audio/video 1394 LINK layer controller and PDI1394P11A 200 Mbits/sec PHY. divio provides a complete easy to integrate DV/IEEE1394 solution to OEMs to reduce time-to-market and development costs.

The NW700 provides an unprecedented feature-set that deliver real-time DV decoding functions to empower the next generation of consumer electronics devices.

Features and Benefits

Enhanced Feature set
- Fully DV-SD Compliant
- Automatic Audio and AUX Code Processing
- Pin compatible with NW701 (DV CODEC)

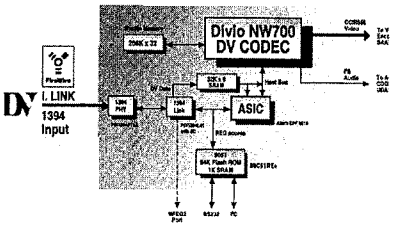
Low System Cost
- Integrated single-chip design including AV processing and video decoding
- Glue-less interface to Video Encoder (SAA7121), Audio Encoder (UDA1340), Micro-controller, and memory
- Integrated shuffle memory logic
- Requires only one 256K x 32 EDO DRAM

Real-time Performance
- High speed (33Mbytes/s throughput)
- 54MHz double clock speed for dual stream applications

Video and Audio Support
- CCIR656 Video output and I²S Audio output
- Support NTSC and PAL
- Selectable Audio channel (A/B or C/D)
- 48, 44.1, and 32KHz (12- and 16-bit) audio support

Simple Host Bus connectivity
- 8 or 16-bit asynchronous host bus interface
- built-in 512 byte DV FIFO
- Three interrupt pins for enhanced system control

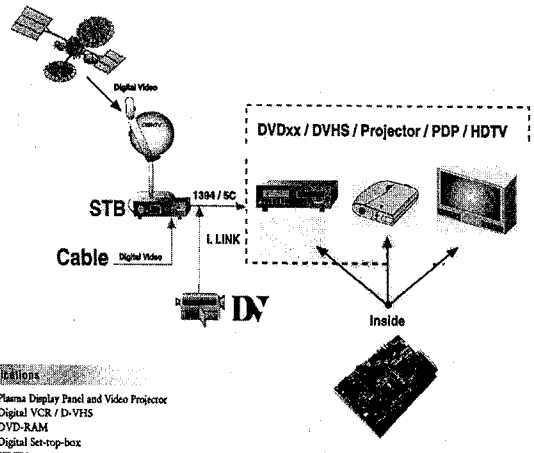
Daytona Beach DV Decode Module



A P P L I C A T I O N S

NW700

DV Decoder
Daytona Beach
Reference Solution



Applications

Plasma Display Panel and Video Projector
Digital VCR / D-VHS
DVD-RAM
Digital Set-top-box
HDTV

Daytona Beach Reference Kit

Board Components

- divio NW700 - DV Decoder
- 8051 µC (P89C51RD2)
- 100p FPGA/32k x 8 SRAM
- IEEE1394 LINK (PDI1394L4X)
- IEEE1394 PHY (PDI1394P11A)
- 256 x 32 EDO Memory

Manufacturing Kit Contents

- Daytona Beach Reference Design
- Schematics, Gerber Files and BOM
- Technical Documents and Manuals
- FPGA and Firmware Source Code

Ordering Information

Part Number	*Description*
• NW700LQ	DV Decoder
• Daytona Beach	Manufacturing Kit

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9.12 List of Abbreviations

Digital Board

+12V
+12V Power Supply
+2V5_FLI
+2V5 Power Supply for FLI
+2V5_PLL
+2V5 Power Supply for PLL
+3V3
+3V3 Power Supply
+3V3_ANA
+3V3 Power Supply Analogue
+3V3_DD
+3V3 Power Supply Digital
+3V3_FLI
+3V3 Power Supply for FLI
+5V
+5V Power Supply
+5V_BUFFER
+5V Power Supply for Video Filters
5508_HS
Horizontal Synchronisation from Host Decoder to Progressive Scan
5508_ODD_EVEN
Odd - Even control from Host Decoder to Progressive Scan
-5V
-5V Power Supply
-5V_BUFFER
-5V Power Supply for Video Filters
A_EMPRESS(13:0)
EMPRESS address output to SDRAM
ACC_ACLK_OSC
Audio Clock PLL output sync with incoming video for record
ACC_ACLK_PLL
Audio Clock PLL output for play back
ACLK_EMP
EMPRESS audio clock output
AD_ACLK
Audio Decoder Clock
AD_BCLK
Audio Decoder I2S bit clock
AD_DATAO
Audio Decoder Output data (PCM)
AD_SPDIF33
Audio digital output to the analog board
AD_WCLK
Audio Decoder I2S word clock
AE_ACLK
Audio Encoder Clock
AE_ACLK_OEN
Audio Encoder Clock Output Enable
AE_BCLK
Audio Encoder I2S bit clock
AE_BCLK_DV
Audio Encoder I2S bit clock to DVIO
AE_BCLK_VSM
Audio Encoder I2S bit clock to VSM
AE_DATAI
Audio Encoder Input data (PCM)
AE_DATAI_DV
Audio Encoder Input data (PCM) from DVIO
AE_DATAO
Audio Encoder Output data (PCM)
AE_WCLK
Audio Encoder I2S word clock
AE_WCLK_DV
Audio Encoder I2S word clock to DVIO
AE_WCLK_VSM
Audio Encoder I2S word clock to VSM
ANA_WE
Analogue write enable
ANA_WE_LV
Analogue write enable Low Voltage
B_IN_VIP
Video blue input to Video Input Processor
B_OUT
Video blue output from Host Decoder
B_OUT_B
Filtered blue video output
BA
Bank Address
BCLK_CTL_SERVICE
Bitclock control Service Interface
BE_BCLK
Basic Engine I2S bit clock
BE_BCLK_VSM
Basic Engine I2S bit clock to VSM
BE_CPR
Basic Engine Control Processor ready to accept data
BE_DATA_RD
Basic Engine Data read
BE_DATA_WR
Basic Engine Data write
BE_FAN
Basic Engine FAN
BE_FLAG
Basic Engine error flag
BE_IRQN
Basic Engine interrupt request
BE_LOADN
Basic Engine LOAD(LOW active)
BE_RXD
Basic Engine S2B received data
BE_SUR
Basic Engine servo unit ready to accept data (S2B)
BE_SYNC
Basic Engine sector/abs time sync
BE_TXD
Basic Engine S2B transmitted data
BE_V4
Basic Engine versatile input pin
BE_WCLK
Basic Engine I2S word clock
C_IN
Video Chrominance input
C_IN_VIP
Chrominance input to Video Input Processor
C_OUT
Chrominance output from Host Decoder
C_OUT_B
Filtered Chrominance output
CAS
Column Address strobe
CB_OUT(9:0)
Chrominance Blue out
CLK4
SDRAM clock
CPUINT0
Control processor unit interrupt
CPUINT1
Control processor unit interrupt
CR_OUT(9:0)
Chrominance Red out
CTS1P
Clear to send (Service Interface)
CVBS_OUT
Composite video output out of the Host Decoder
CVBS_OUT_B
Filtered Composite video output
CVBS_OUT_B_VIP
Composite video output to Video Input Processor(digital board video loop)
CVBS_Y_IN
Composite video/Luminance input
CVBS_Y_IN_A
Composite video/Luminance input to Video Input Processor
CVBS_Y_IN_B

Composite video/Luminance input to Video Input Processor
CVBS_Y_IN_C
Composite video/Luminance input to Video Input Processor
D_ADDR(10:0)
Address bus
D_DATA(29:0)
Data bus
D_EMPRESS(15:0)
SDRAM data input/output of EMPRESS
D_PAR_D(7:0)
Front-end parallel interface data (record)
D_PAR_DVALID
Front-end parallel interface data valid
D_PAR_REQ
Front-end parallel interface request
D_PAR_STR
Front-end parallel interface strobe
D_PAR_SYNC
Front-end parallel interface sync
DV_IN_CLK
Digital Video in clock from DVIO board
DV_IN_DATA(7:0)
Digital Video in data bus from DVIO board
DV_IN_HS
Digital Video in horizontal synchronisation from DVIO board
DV_IN_VS
Digital Video in vertical synchronisation from DVIO board
EMI_A(21:1)
External Memory Interface Address Bus(Host Decoder)
EMI_BE0N
External Memory Interface Lower byte enable(Host Decoder)
EMI_BE1N
External Memory Interface Upper byte enable(Host Decoder)
EMI_CAS0N
External Memory Interface SDRAM column address strobe(Host Decoder)
EMI_CE1N
External Memory Interface VSM Lower bank enable
EMI_CE2N
External Memory Interface VSM Higher bank enable
EMI_CE3N
External Memory Interface flash IC's enable
EMI_D(15:0)
External Memory Interface Data Bus(Host Decoder)
EMI_PROCCLK
External Memory Interface Processor Clock(Host Decoder)
EMI_RWN
External Memory Interface Read/Write control signal(Host Decoder)
EMI_WAIT
External Memory Interface Wait state request(Host Decoder)
EMPRESS_BOOT
EMPRESS BOOT select input
EMPRESS_IRQN
EMPRESS Interrupt request output
FLASH_OEN
FLASH output enable control signal
G_IN_VIP
Video green input to Video Input Processor
G_OUT
Video green output from Host Decoder
G_OUT_B
Filtered green video output from Host Decoder
GNDD
Digital Ground
HD_M_AD(13:0)
Host Decoder SDRAM address bus
HD_M_CASN
Host Decoder SDRAM column address strobe
HD_M_CLK
Host Decoder SDRAM clock
HD_M_CS0N
Host Decoder SDRAM chip select
HD_M_DQ(15:0)
Host Decoder SDRAM data bus
HD_M_DQML
Host Decoder SDRAM data mask enable(Lower)
HD_M_DQMU
Host Decoder SDRAM data mask enable(Upper)
HD_M_RASN
Host Decoder SDRAM row address strobe
HD_M_WEN
Host Decoder SDRAM write enable
HSOUT
Horizontal synchronisation OUT
ION
Inverted ON: Enable the power supply for the digital board when LOW
IRESET_DIG
Initialisation of the digital board, HIGH when power ON
JTAG3_TCK
JTAG Test Clock
JTAG3_TD_VIP_TO_VE
JTAG Transmitted Data Video Input Processor to Video Encoder
JTAG3_TD_VSM_TO_VIP
JTAG Transmitted Data Versatile Stream Manager to Video Input Processor
JTAG3_TMS
JTAG Test Mode Select
JTAG3_TRSTN
JTAG Test part ResetN
LOAD_DVN
LOAD Digital Video(LOW active)
MUTEN
Mute enable
MUTEN_LV
Mute enable Low Voltage
P_SCAN_YUV(7:0)
Progressive Scan digital video bus
R_IN_VIP
Video Red input to Video Input Processor
R_OUT
Video Red output from Host Decoder
R_OUT_B
Filtered Red Video output from Host Decoder
RAS
Row Address Strobe
RESETN
Reset Host Decoder
RESETN_BE
System reset basic engine (buffered)
RESETN_DVIO
System reset Digital Video Input Output (buffered)
RESETN_VE
System reset Video Encoder
ROMH_CEN
Flash 2 chip enable
ROML_CEN
Flash 1 chip enable
RSTN_BE
Reset control of basic engine
RSTN_DVIO
Reset control of DVIO
RTS1P
Ready To Send data to service serial interface
RX1P
Receive data from service serial interface
SCL
I2C bus clock
SD_CASN
SDRAM Column Address strobe output (active LOW)
SD_CLK
SDRAM clock output
SD_CLKE
SDRAM clock enable output
SD_CSN
SDRAM
SD_DQM(1:0)
SDRAM data mask enable output

SD_RASN
SDRAM row address strobe output
SD_WEN
SDRAM write enable output
SDA
I2C bus data
SEL_ACLK1
Select audio clock(playback)
SM_CS3N
SRAM chip select
SM_LBN
SRAM lower bank
SM_OEN
SRAM output enable
SM_UBN
SRAM upper bank
SM_WEN
SRAM write enable
SMA(17:0)
SRAM address output
SMD(15:0)
SRAM data input/output
SYSCLK_EMPRESS
System clock EMPRESS
SYSCLK_PROGSCAN
System clock Progressive Scan
SYSCLK_VSM_5508
System clock VSM and Host decoder
TX1P
Transmit data to service serial interface
U_IN
Video U input
U_IN_VIP
Video U input to Video Input Processor
V_IN
Video V input
V_IN_VIP
Video V input to Video Input Processor
VCC3_CLK_BUF
Power supply 3V3 clock buffer
VCC3_VSM
Power supply 3V3 Versatile Stream Manager
VCC3_VSM_MEM
Power supply 3V3 Versatile Stream Manager Memory
VCC5_4046
Power supply 5V to PLL IC
VDD_125
Power supply 5V to buffer 7202
VDD_CORE
Sti5508 Core supply voltage 2.5V
VDD_EMP
Empress supply voltage 3.3V
VDD_EMP_CORE
Empress Core supply voltage 2.5V
VDD_FLASH_H
Flash 7301 supply voltage
VDD_FLASH_L
Flash 7302 supply voltage
VDD_LVC32
Power supply LVC32
VDD_PCM
Power supply Audio decoder of Sti5508
VDD_PLL
Power supply PLL audio decoder of Sti5508
VDD_RGB
Power supply video encoder of Sti5508
VDD_STI
Power supply of Sti5508
VDD_YCC
Power supply video encoder of Sti5508
VDD5_MK2703
Power supply MK2703
VDD5_OSC
Power supply Oscillator
VDDA1A_7118
Power supply for analog input of VIP
VDDA2A_7118
Power supply for analog input of VIP
VDDA3A_7118
Power supply for analog input of VIP
VDDA4A_7118
Power supply for analog input of VIP
VDDE_7118
Power supply digital for peripheral cells of VIP
VDDI_7118
Power supply digital for core of VIP
VDDX_7118
Power supply for crystal oscillator of VIP
VE_DATA(7:0)
Video Encoder data Bus
VE_DSN
Video Encoder Data Strobe
VE_DTACKN
Video Encoder Data Transfer acknowledge
VIP_ERROR
Video Input Processor error
VIP_FB
Video Input Processor Fast Blanking
VIP_FID_FF
Video Input Processor field indentifier to Flip Flop
VIP_HS
Video Input Processor horizontal synchronisation
VIP_ICLK
Video Input Processor Input Clock
VIP_IDQ
Video Input Processor output data qualifier
VIP_IGP1
Video Input Processor input general purpose 1
VIP_INT
Video Input Processor interrupt
VIP_RTS1
Video Input Processor ready to send
VIP_VS
Video Input Processor vertical synchronisation
VIP_YUV(7:0)
Video Input Processor digital video(CCIR 656)
VS_IN
Vertical synchronisation IN
VSM_M_A(13:0)
Versatile Stream Manager SDRAM address bus
VSM_M_CASN
Versatile Stream Manager SDRAM column address strobe
VSM_M_CLKEN
Versatile Stream Manager SDRAM clock enable
VSM_M_CLKOUT
Versatile Stream Manager SDRAM clock out
VSM_M_D(15:0)
Versatile Stream Manager SDRAM data bus
VSM_M_LDQM
Versatile Stream Manager SDRAM lower data mask enable
VSM_M_RASN
Versatile Stream Manager SDRAM row address strobe
VSM_M_UDQM
Versatile Stream Manager SDRAM upper data mask enable
VSM_M_WEN
Versatile Stream Manager SDRAM write enable
VSM_UART1_CTSN
Versatile Stream Manager UART1 clear to send to analog board (UART1 is gateway to analog board)
VSM_UART1_RTSN
Versatile Stream Manager UART2 clear to send to DVIO board (UART2 is gateway to DIVIO board)
VSM_UART1_RX
Versatile Stream Manager UART1 ready to send to analog board
VSM_UART1_TX
Versatile Stream Manager UART2 ready to send to DVIO board
VSM_UART2_CTSN

Versatile Stream Manager UART1 received data to analog board
VSM_UART2_RTSN
Versatile Stream Manager UART2 received data to DVIO board
VSM_UART2_RX
Versatile Stream Manager UART1 transmitted data to analog board
VSM_UART2_TX
Versatile Stream Manager UART2 transmitted data to DVIO board
VSOUT
Vertical synchronisation OUT
WE
Write Enable
Y_IN
Luminance input from analog board
Y_OUT
Luminance output from Host Decoder
Y_OUT_B
Filtered luminance output
YY_OUT(9:0)
Luminance output from FLI

Divio Board

+35V_DV_EDO
+3V3 Power supply EDO Bus IC7404
+3V3
+3V3 Power supply
+3V3_DLY
+3V3 Power supply for IC7500
+3V3_DV
+3V3 Power supply for IC7404
+3V3_FPGA
+3V3 Internal Power supply for IC7303
+3V3_FPGA_CONF
+3V3 Power supply for IC 7300
+3V3_IEEE_A
+3V3 Analogue Power supply for PHY IC 7101
+3V3_IEEE_D
+3V3 Digital Powar supply for PHY IC 7101
+3V3_IEEE_PLL
+3V3 PLL Power supply for PHY IC 7101
+3V3_LINK
+3V3 Power supply IC7103
+3V3_PLL
+3V3 Power supply IC7307 & IC7308
+3V3_SRAM
+3V3 Power supply IC7301, IC7302, IC7305 & IC7306
+5V
+5V Power supply
+5V_PROC
+5V Power supply IC7200, IC7201, IC7203 & IC7208
+VCC_DV_RAM
+3V3 Power supply for DV_RAM (IC7400--> IC7404)
1394_RSTN
Reset of LINK IC (7103) and PHY IC (7101)
A(0:8)
Address lines
AUD_BCLK
Audio Bit Clock
AUD_MUTE
Audio Mute
AUD_SDI
Audio Serial Data Input
AUD_SDO_CON
Audio Serial Data Output to buffer IC 7505
AUD_SDO_DAC
Audio Serial Data Output to DAC IC 7506
AUD_WS_701
Audio Word Select to DV CODEC IC 7404
AUD_WS_OUT
Audio Word Select to buffer IC 7505
BUFENN_AUD
Buffer Enable Audio
BUFENN_VID
Buffer Enable Video
CCLK
Configuration Clock
CLK27M
27MHz Clock
CLK27M_CON
27MHz Clock to Digital Board
CLK27M_DV
27MHz Clock Digital Video Codec
CLK27M_OSC
27MHz Clock IC7304
CLOCKGENAUD
Clock generator Audio
CLOCKGENVID
Clock generator Video
CTSN
Clear to Send
DATA
Data from config ROM
DONE
Indication of the completion of the configuration process
DOUT
Serial configuration data output
DV_ASN
DVCODEC Address Strobe
DV_DRQN
DVCODEC Data Request Interrupt
DV_DSLN
DVCODEC Data Strobe Lower 8 bits
DV_DSUN
DVCODEC Data Strobe Upper 8 Bits
DV_DTACKN
DVCODEC Data Transfer Acknowledge
DV_ERRN
DVCODEC Error Interrupt
DV_HS_IN
DVCODEC Horizontal synchronisation In
DV_HS_OUT
DVCODEC Horizontal synchronisation Out
DV_LCN
DVCODEC Last Code Interrupt
DV_PDN
DVCODEC Power Down
DV_RSTN
DVCODEC System Reset for NW701
DV_RWN
DVCODEC Read/Write control signal
DV_VS
DVCODEC Vertical synchronisation
FIFOA_A(0:15)
FIFO buffer A Address bus
FIFOA_OEN
FIFO buffer A Output enable
FIFOA_WEN
FIFO buffer A Write enable
HAD(0:7)
Host Address/Data bus for register settings of IC7404
INITN
Initiate Configuration
IO(0:30)
Data bus of IC7404
ISPN
In System Program Line (used for programming IC7203)
LCASN
Lower Column Address strobe for IC7404 DRAMS
LINK_AVCLK
LINK IC Audio/Video Interface Clock
LINK_AVFSYNC
LINK IC Audio/Video frame sync
LINK_AVREADY
LINK IC Audio/Video data ready to send
LINK_AVSYNC
LINK IC Audio/Video packet sync

LINK_AVVALID
LINK IC Audio/Video data valid
LINK_CSN
LINK IC chip select
LINK_INTN
LINK IC interrupt
LINKFIFO_DQ(0:7)
Audio Video data interface
PA(0:15)
SRAM processor address
PAD(0:7)
SRAM processor data
PALE
Processor Address Latch Enable
PHY_CNA
PHY 1394 cable not active
PHY_LPS
LINK IC power status
PINTON
Processor interrupt 0
PINT1N
Processor interrupt 1
PRDN
Processor read
PROGRAMN
Low active input to initiate a configuration cycle
PRSTN
Processor reset
PWRN
Processor write
RASN
Row address strobe
RESETN
DVIO board reset
RTSN
System Reset
RXD
Receive Data
SRAMCE0N
SRAM processor chip enable 0
SRAMRDN
SRAM processor output enable
TCK
Boundary scan Test Clock
TDI
Boundary scan Test Data Input
TDO
Boundary scan Test Data Output
TDO_CONF
Boundary scan Test Data Output from IC 7309
TMS
Boundary scan Test Mode Select
TXD
Transmitted Data
UCASN
Upper column address strobe
WEN
Write Enable control signal to SRAM
YUV(0:7)
Digital Video

Analog Board

+5VSTBY
Permanent Supply 5V
8SC2
Pin8 Scart2 (only for Europe)
A_DATA
Data from Analog- to Digital-Board (UART-Communication)
A_RDY
Analog-board ready (status information to digital-board)
A18 - A19
Parallel Address Bus (CC - Flash-ROM and S-RAM)
A8 - A17
Parallel Address Bus (CC - Flash-ROM and S-RAM)
AD0 - AD7
Parallel Address and Data Bus (CC - Flash-ROM and S-RAM)
AFC
Automatic Frequency Control
AFEL
Audio Frontend Left
AFER
Audio Frontend Right
AGC / WSRI
Automatic Gain Control (for Europe), Wide Screen Rear In (for NTSC)
AINFL
Audio In Front Left
AINFR
Audio In Front Right
AKILL
Audio Kill Signal
ALADC
Audio Left to ADC
ALDAC
Audio Left from DAC
ALE
Address Latch Enable
AM0
Adress-mode 0
AM1
Adress-mode 1
ARADC
Audio Right to ADC
ARDAC
Audio Right from DAC
ASCC1M
Audio Scart 1 Mute (System Clock Output for Real time Clock-Adjustment)
AVCC
Power Supply for A/D-converter
AVSS
GND-Pin for A/D-converter
CFIN
Chroma Front In
CS0_
Chip Select 0 (CC - S-RAM)
CS2_
Chip Select 2 (CC - Flash-ROM)
CVBSFIN
Video Front In
D_DATA
Data from Digital- to Analog-Board (UART-Communication)
D_RDY
Digital-board ready (status information from digital-board)
DAC_MUTE
Mute Signal for DAC
DAOUT
Digital Audio Out
DVAL
Audio from Digital Video In Left
DVAR
Audio from Digital Video In Right
DVCC1
Power Supply Pin
DVCC2
Power Supply Pin
DVCC3
Power Supply Pin
DVSS1
GND Pin
DVSS2
GND Pin
DVSS3
GND Pin
FAN_OFF
Fan for Basic engine
FBIN
Fast Blanking input
FOME

FOllow ME Status line (matching signals yes/no; only for Europe)
G1...10
DISPLAY GRID
INT
Interrupt OUT for the CC
INT
Interrupt – line from Display Print
ION
Inverse ON-Line
IPFAIL
Inverse Power Fail Detection
IPOR
Inverse Power On Reset
IRESET
Inverse Reset Input
IRR
Signal from IR-Receiver
K1
Key-Input-Line
K2
Key-Input-Line
KILL
Audio Mute
P50 IN
P50 INput-line (only for Europe)
P50 OUT
P50 OUTput-line (only for Europe)
POR_DC
Power On Reset for Display Control Print (Ext_DL)
PSS
Pal/Secam-Select
PWM_FIL
Control line for Filament Voltage Generation
PWONSW
Amplifier Switch Audio A/D Converter
RD_
Output Enable ReaD (CC - Flash-ROM and S-RAM)
RECLED
Control Signal for REC-LED
RESET_DIG
Reset Line to Digital Board
RP_
Inverse Reset line to Flash-ROM
RSA1/2
Record Selector 1/2
RY/BY_
Ready/Busy – input line (from Flash-ROM)
SIF1
Sound intermediate frequency
SB1
Secam Band 1 (PCB-Test entrance)
SCL
I²C-Bus
SCLSW
Switched I²C-Bus
SDA
I²C-Bus
SDASW
Switched I²C-Bus
SFS_TS
SAW Filter Select Trap Select
STBY
Standby-Line (Flash_Toshiba)
SYNC
Video Sync input
TEMP_SENSE
Temperature Sense Line
VER
HW-version input
VFV
Video from Frontend
VKK
VFT Driver Power Supply
VREFH
Pin for Reference-voltage input to A/D-converter
VREFL
Pin for Reference-voltage input to A/D-converter
VS1/2
View Selector 1/2
WR_
Write Enable (CC - Flash-ROM and S-RAM)
WSFI
Wide Screen Signalling Front In
WU
Wake Up
X1
Oscillator Pin
X2
Oscillator Pin
XIN
Oscillator Pin
XOUT
Oscillator Pin
XT1
Low Frequency Oscillator Pin
XT2
Low Frequency Oscillator Pin
YFIN
Luminance Front In

10. Spare Parts List

Mechanical Parts

0001	3103 607 90062	CONTROL PANEL ASSY EU DVIO, DVDR890
0001	3103 607 90071	CONTROL PANEL ASSY EU, DVDR880
0001	3103 607 90101	CONTROL PANEL ASSY UK, DVDR880/05x
0001	3103 607 90112	CONTROL PANEL ASSY UK DVIO, DVDR890/05x
0010	3103 607 50101	KEY-SET RIGHT ASSY
0011	3103 607 50131	KEY-SET LEFT ASSY
0012	3103 607 50161	KEY REC ASSY
0021	3103 607 50181	DISPLAY-DECOR-WINDOW ASSY
0026	3103 607 50191	FLAP ASSY , DVDR880
0026	3103 607 50271	FLAP ASSY DVIO, DVDR890
0070	3103 607 90081	TRAY FRONT ASSY
0105	3103 607 50251	FOOT ASSY
0300	3103 607 50231	COVER ASSY

Miscellaneous Parts

0350	3128 147 14021	REMOTE CONTROL 25110/01
0351▲	2422 070 98133	MAINSCORD EURO
0351▲	4822 321 10713	MAINSCORD UK
0352	3103 601 00111	SCART CABLE EU
0355	3103 308 92610	CABLE AUDIO 2X2RCA MALE 1.5MTR
0356	4822 321 61579	VIDEO-CABLE
0357	4822 320 50377	CONNECT. CABLE PAL
0365	9307 002 60006	DVDRW/006 PHILIPS DISC EUROPE
0380	3103 605 20011	DIR. FOR USE DVDR 880/001
0380	3103 605 20031	DIR. FOR USE DVDR 880/021
0380	3103 605 20051	DIR. FOR USE DVDR 880/051
0380	3103 605 20061	DIR. FOR USE DVDR 890/001
0380	3103 605 20101	DIR. FOR USE DVDR 890/051
0381	3103 605 20021	DIR. FOR USE DVDR 880/001
0381	3103 605 20041	DIR. FOR USE DVDR 880/021
0381	3103 605 20071	DIR. FOR USE DVDR 890/001
0381	3103 605 20091	DIR. FOR USE DVDR 890/021
1001▲	3103 608 50180	ANALOGUE/ POWER BOARD EURO
1001▲	3103 608 50240	ANALOGUE/ POWER BOARD UK
1002	3104 128 08440	PCB ASSY DIG BOARD 1.5 EU
1003▲	3104 128 08500	PCB ASSY DVIO 4323
1004▲	3103 608 50170	DISPLAY BOARD
1005	3103 608 50320	FRONT CONNECTOR BOARD
1006	3104 128 07610	PCB ASSY 4319 DVIO-FRONT
1007		BASIC ENGINE VAE8020

Cables

8001	3103 601 00012	FFC FOIL 22P/90/22P BD FO
8003	3103 601 00032	FFC FOIL 10P/100/10P AD
8004	3103 601 00042	CBLE KR 4P/205/4P KR SHI.
8005	3103 601 00052	FFC FOIL 22P/200/22P BD
8006	3103 601 00062	CBLE KR 12P/115/12P KR UL
8007	3103 601 00072	FFC FOIL 10P/647/10P BD UL
8008	3104 157 11790	CWAS SPLIT FLEX 30 100 32S
8009	3103 601 00082	CBLE KR 8P/110/8P KR UL
8010	3103 601 00132	CBLE KR 9P/715/9P KR SHIELDED
8011	3104 128 92921	CABLE IEEE-1394 4P AMP

Display Board

Various

1111	4822 242 82114	EFOEC8004/T4
1160	4822 276 13732	SWITCH TACT PUSH
1161	4822 276 13732	SWITCH TACT PUSH
1162	4822 276 13732	SWITCH TACT PUSH
1163	4822 276 13732	SWITCH TACT PUSH
1164	4822 276 13732	SWITCH TACT PUSH
1165	4822 276 13732	SWITCH TACT PUSH
1166	4822 276 13732	SWITCH TACT PUSH
1170	4822 276 13732	SWITCH TACT PUSH
1171	4822 276 13732	SWITCH TACT PUSH
1180	4822 276 13732	SWITCH TACT PUSH
1916	4822 267 11031	10P. FEM. V

2100	3198 017 34730	0603 16V 47nF COL
2101	4822 124 81151	22µF 50V
2102	4822 121 51252	470nF 5% 63V
2103	4822 124 21732	10µF 20% 25V
2104	3198 017 34730	0603 16V 47nF COL
2105	5322 126 11578	1nF 10% 50V 0603
2106	4822 126 13879	220nF 20% 16V
2111	3198 017 34730	0603 16V 47nF COL
2112	4822 124 11946	22µF 20% 16V
2119	2238 586 59812	0603 50V 100NP80M
2150	4822 124 11946	22µF 20% 16V
2168	5322 126 11583	10nF 10% 50V 0603
2169	5322 126 11583	10nF 10% 50V 0603

3100	4822 051 30103	10k 5% 0.062W
3101	4822 116 52304	82k 5% 0.5W
3102	4822 116 52304	82k 5% 0.5W
3103	4822 051 30471	470Ω 5% 0.062W
3104	4822 051 30471	470Ω 5% 0.062W
3105	4822 051 30331	330Ω 5% 0.062W
3106	4822 051 30331	330Ω 5% 0.062W
3107	4822 051 30103	10k 5% 0.062W
3108	4822 051 30102	1k 5% 0.062W
3109	4822 116 52283	4k7 5% 0.5W
3110	4822 050 11002	1k 1% 0.4W
3111	4822 051 30471	470Ω 5% 0.062W
3113	4822 116 83884	47k 5% 0.5W
3120	4822 050 21003	10k 1% 0.6W
3121	4822 051 30101	100Ω 5% 0.062W
3122	4822 116 52175	100Ω 5% 0.5W
3123	4822 116 52175	100Ω 5% 0.5W
3127	4822 050 11002	1k 1% 0.4W
3128	4822 116 52257	22k 5% 0.5W
3150	4822 116 83872	220Ω 5% 0.5W
3151	4822 051 30102	1k 5% 0.062W
3160	4822 051 30103	10k 5% 0.062W
3161	4822 051 30221	220Ω 5% 0.062W
3162	4822 051 30103	10k 5% 0.062W
3163	4822 051 30221	220Ω 5% 0.062W
3168	4822 051 30222	2k2 5% 0.062W
3169	4822 051 30222	2k2 5% 0.062W
3170	4822 116 52283	4k7 5% 0.5W
3171	4822 051 30102	1k 5% 0.062W
3172	4822 117 12063	NTC DC 5W 10k 5%
3180	4822 117 12925	47k 1% 0.063W 0603
3181	4822 051 30221	220Ω 5% 0.062W
3182	4822 051 30221	220Ω 5% 0.062W
3194	4822 117 12917	1Ω 5% 0.062W CASE0603

5110	4822 157 11706	10µH 5% 2.4X3.4
5191	2422 549 44607	IND FXD SM EMI100mH z 600RR
5192	2422 549 44607	IND FXD SM EMI100mH z 600RR
5193	4822 157 50964	100µH

6100	4822 130 10852	BZX284-C6V8
6180	4822 130 83092	TLHR4205

7100	2722 171 07729	VFD 10-BT-242GNK (FTB0)B
7101	3198 010 42310	BC847BW
7102	3198 010 42310	BC847BW
7103	4822 130 40981	BC337-25
7104	4822 130 41246	BC327-25
7105	3198 010 42310	BC847BW
7106	3198 010 42310	BC847BW
7110	3103 165 13731	TMP87C874F/LDCP1
7150	9322 155 82667	IR RECEIVER TSOP2236
7180	4822 130 60854	DTA124EU-W

Front AV Board

Various

1910	2422 026 05301	SOC CINCH V 3P FJPJ1127 B
1911	2422 025 10185	CON BM H 9P M 2.00 PH B
1912	2422 026 05307	CON MDIN H 4P F YKF51 B

2202	4822 126 14241	0603 50V 330P COL R
2205	4822 126 14241	0603 50V 330P COL R
2206	2238 586 59812	0603 50V 100NP80M

3201	4822 051 30102	1k 5% 0.062W
3202	4822 051 30105	1M 5% 0.062W
3206	4822 051 30102	1k 5% 0.062W
3207	4822 051 30105	1M 5% 0.062W
3210	4822 116 83868	150Ω 5% 0.5W
3211	4822 051 30759	75Ω 5% 0.062W
3212	4822 051 30759	75Ω 5% 0.062W
3213	4822 051 30759	75Ω 5% 0.062W

6200	9322 146 61685	DIO REG SM DF3A6.8FU TOSJ
6201	9322 146 61685	DIO REG SM DF3A6.8FU TOSJ
6202	9322 146 61685	DIO REG SM DF3A6.8FU TOSJ
6203	9322 146 61685	DIO REG SM DF3A6.8FU TOSJ
6204	9322 146 61685	DIO REG SM DF3A6.8FU TOSJ

Analog Board

Various

1001▲	2422 086 10919	PROT DEV 65V 125MA MP13
1302▲	4822 252 11215	DSP301N-A21F
1303▲	4822 071 51002	19372(1A)
1304▲	2422 086 10786	FUSE,RADIAL4AMP,
1306▲	2422 086 10919	PROT DEV 65V 125MA MP13
1307▲	2422 086 10954	PROT DEV 65V 1A PSC
1308▲	2422 086 10951	PROT DEV 65V 500MA PSC
1309▲	4822 071 58001	FUSE 800MA PSC
1600	4822 242 10434	L1101-95263-0E1(18,432MHz)
1701	4822 242 81436	OFWK3953M
1702	2422 549 44341	FIL SAW 38MHz 9 OFWK9656M
1703	4822 242 10307	OFWG3956M
1703	4822 242 81436	OFWK3953M
1704	2422 549 44611	FIL CER 5MHz 5 TPSR*MBQ2 BS A
1705	3139 147 17001	TUNER UV1316MK3
1706	4822 242 81572	TPS6,0MB-TF21
1900	4822 265 11154	52030-2210 (22P)
1931▲	2422 030 00304	SOC SUPP AC HOR MALE 9452 B
1932	2422 025 10772	CON BM V 12P M 2.00 PH B
1933	4822 265 11352	CONN. 8P

1940	2422 033 00334	CON BM EURO H 42P F BK GRND-L
1942	2422 025 10769	CON BMT 9P VERT PH-B
1943	4822 267 11031	10P, FEM. V
1945▲	3103 608 50330	UP SUB PCB EURO
1947	4822 265 11154	52030-2210 (22P)
1948	4822 267 10994	4P, MDIN
1949	2422 026 05308	SOC CINCH H 3P F YEWHRD Y
1951	4822 267 31729	CON BM CINCH H1P F BK B
1960	2422 025 09406	CON BM 4P VERT PH-B
1990	4822 242 73552	13,875 000 MHz

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2001	4822 124 80483	47µF 20% 6.3V
2002	2238 586 59812	0603 50V 100NP80M
2003	2238 586 59812	0603 50V 100NP80M
2004	4822 124 80483	47µF 20% 6.3V
2005	4822 124 42234	100µF 20% 6.3V
2006	4822 126 11785	0603 50V 47P PM5
2007	4822 124 21732	10µF 20% 25V
2008	3198 016 31020	0603 25V 1nF
2009	2238 586 59812	0603 50V 100NP80M
2010	4822 124 80483	47µF 20% 6.3V
2011	4822 124 21732	10µF 20% 25V
2012	2238 586 59812	0603 50V 100NP80M
2013	4822 124 42234	100µF 20% 6.3V
2014	2238 586 59812	0603 50V 100NP80M
2015	2238 586 59812	0603 50V 100NP80M
2018	2238 586 59812	0603 50V 100NP80M
2019	2238 586 59812	0603 50V 100NP80M
2020	4822 124 80483	47µF 20% 6.3V
2023	4822 124 80483	47µF 20% 6.3V
2024	4822 126 14225	56pF 5% 50V 0603
2025	3198 016 31020	0603 25V 1nF
2026	4822 126 14225	56pF 5% 50V 0603
2029	4822 124 80483	47µF 20% 6.3V
2031	4822 124 22652	2.2µF 20% 50V
2032	5322 126 11583	10nF 10% 50V 0603
2033	4822 126 13881	470pF 5% 50V
2034	4822 126 13881	470pF 5% 50V
2037	4822 126 13193	4.7nF 10% 63V
2038	4822 126 13193	4.7nF 10% 63V
2039	4822 126 13193	4.7nF 10% 63V
2040	4822 126 13193	4.7nF 10% 63V
2301▲	4822 126 14088	2.2nF 20% 250V
2302▲	4822 121 10512	275V 220nF 20%
2303	4822 122 31175	1nF 10% 500V
2304	4822 126 10206	2.2nF 10% 500V
2305	4822 124 40849	330µF 20% 16V
2306	4822 124 40184	1000µF 20% 10V
2307	4822 122 31175	1nF 10% 500V
2308	4822 121 70386	47nF 10% 250V
2309▲	2222 151 90053	EL 151 400V S 68µF PM20
2310	5322 126 11578	1nF 10% 50V 0603
2311	5322 126 11578	1nF 10% 50V 0603
2312	2020 021 91506	EL ZL 16V S 1000µF PM20 B
2313	4822 124 40184	1000µF 20% 10V
2315▲	4822 126 14525	47pF 5% 1KV
2317	5322 126 11578	1nF 10% 50V 0603
2318	4822 126 10206	2.2nF 10% 500V
2319	4822 124 40849	330µF 20% 16V
2320	4822 124 80791	470µF 16V 20% 105C DXH=8X11.5
2321	2238 586 59812	0603 50V 100NP80M
2322	4822 124 41584	100µF 20% 10V
2323	4822 124 42234	100µF 20% 6.3V
2324	2238 586 59812	0603 50V 100NP80M
2325	4822 124 81151	22µF 50V
2326	4822 121 41857	10nF 5% 250V
2327	2238 586 59812	0603 50V 100NP80M
2328	4822 124 81151	22µF 50V
2329	2238 586 59812	0603 50V 100NP80M
2330	5322 126 11578	1nF 10% 50V 0603
2331	2238 586 59812	0603 50V 100NP80M
2332	4822 124 22651	1.0µF 20% 50V
2334	2238 586 59812	0603 50V 100NP80M
2335	4822 124 21732	10µF 20% 25V
2336	2238 586 59812	0603 50V 100NP80M
2337	4822 122 33741	10pF 10% 50V
2338	2238 586 59812	0603 50V 100NP80M
2339	3198 017 41050	0603 10V 1µF COL R
2340	2020 554 90148	CERSAF NSA 250V S 470P PM20
2341	3198 017 41050	0603 10V 1µF COL R
2342	3198 017 41050	0603 10V 1µF COL R
2402	2238 586 59812	0603 50V 100NP80M
2403	4822 124 80483	47µF 20% 6.3V
2404	2238 586 59812	0603 50V 100NP80M
2405	4822 124 80483	47µF 20% 6.3V
2406	5322 126 11583	10nF 10% 50V 0603
2407	4822 122 33741	10pF 10% 50V

2408	3198 017 41050	0603 10V 1µF COL R
2409	2238 586 59812	0603 50V 100NP80M
2410	3198 017 41050	0603 10V 1µF COL R
2411	2238 586 59812	0603 50V 100NP80M
2412	4822 122 33741	10pF 10% 50V
2413	4822 124 80483	47µF 20% 6.3V
2414	2238 586 59812	0603 50V 100NP80M
2416	3198 017 41050	0603 10V 1µF COL R
2417	4822 124 11947	10µF 20% 16V
2418	3198 017 41050	0603 10V 1µF COL R
2419	3198 017 41050	0603 10V 1µF COL R
2420	2238 586 59812	0603 50V 100NP80M
2421	4822 124 11947	10µF 20% 16V
2422	5322 126 11583	10nF 10% 50V 0603
2423	3198 017 41050	0603 10V 1µF COL R
2424	4822 124 80483	47µF 20% 6.3V
2425	2238 586 59812	0603 50V 100NP80M
2427	3198 017 41050	0603 10V 1µF COL R
2428	4822 124 11947	10µF 20% 16V
2429	4822 124 11946	22µF 20% 16V
2430	2238 586 59812	0603 50V 100NP80M
2432	4822 124 42234	100µF 20% 6.3V
2433	3198 017 34730	0603 16V 47nF COL
2434	4822 124 80483	47µF 20% 6.3V
2435	2238 586 59812	0603 50V 100NP80M
2436	3198 017 41050	0603 10V 1µF COL R
2437	3198 017 41050	0603 10V 1µF COL R
2438	3198 017 41050	0603 10V 1µF COL R
2439	2238 586 59812	0603 50V 100NP80M
2440	3198 017 41050	0603 10V 1µF COL R
2441	3198 017 41050	0603 10V 1µF COL R
2442	4822 124 11946	22µF 20% 16V
2443	4822 124 42234	100µF 20% 6.3V
2444	4822 126 13881	470pF 5% 50V
2445	4822 126 13881	470pF 5% 50V
2446	3198 017 41050	0603 10V 1µF COL R
2447	4822 126 13881	470pF 5% 50V
2448	4822 126 13881	470pF 5% 50V
2449	4822 126 13956	68pF 5% 63V CASE 0603
2450	2238 586 59812	0603 50V 100NP80M
2459	3198 017 41050	0603 10V 1µF COL R
2460	4822 124 40769	4.7µF 20% 100V
2461	4822 124 40769	4.7µF 20% 100V
2462	4822 124 11947	10µF 20% 16V
2463	4822 124 11947	10µF 20% 16V
2464	4822 124 21732	10µF 20% 25V
2501	3198 017 41050	0603 10V 1µF COL R
2502	2238 586 59812	0603 50V 100NP80M
2503	2238 586 59812	0603 50V 100NP80M
2504	3198 017 41050	0603 10V 1µF COL R
2505	3198 017 41050	0603 10V 1µF COL R
2506	3198 017 41050	0603 10V 1µF COL R
2507	3198 017 41050	0603 10V 1µF COL R
2508	3198 017 41050	0603 10V 1µF COL R
2509	2238 586 59812	0603 50V 100NP80M
2510	4822 124 42234	100µF 20% 6.3V
2511	2020 009 90097	EL BP NA 16V S 100µF PM20 A
2512	2238 586 59812	0603 50V 100NP80M
2513	3198 017 41050	0603 10V 1µF COL R
2514	2238 586 59812	0603 50V 100NP80M
2515	3198 017 41050	0603 10V 1µF COL R
2516	2020 009 90097	EL BP NA 16V S 100µF PM20 A
2517	5322 126 11578	1nF 10% 50V 0603
2518	2238 586 59812	0603 50V 100NP80M
2519	4822 124 42234	100µF 20% 6.3V
2520	5322 126 11578	1nF 10% 50V 0603
2521	2238 586 59812	0603 50V 100NP80M
2522	2020 009 90097	EL BP NA 16V S 100µF PM20 A
2523	5322 126 11578	1nF 10% 50V 0603
2524	3198 017 41050	0603 10V 1µF COL R
2525	3198 017 41050	0603 10V 1µF COL R
2526	2020 009 90097	EL BP NA 16V S 100µF PM20 A
2527	5322 126 11578	1nF 10% 50V 0603
2530	2238 586 59812	0603 50V 100NP80M
2535	2238 586 59812	0603 50V 100NP80M
2536	2238 586 59812	0603 50V 100NP80M
2580	2238 586 59812	0603 50V 100NP80M
2581	4822 124 42234	100µF 20% 6.3V
2585	2238 586 59812	0603 50V 100NP80M
2586	5322 126 11578	1nF 10% 50V 0603
2587	3198 017 41050	0603 10V 1µF COL R
2590	4822 122 33753	150pF 5% 50V
2600	4822 124 21732	10µF 20% 25V
2601	5322 126 11583	10nF 10% 50V 0603
2602	4822 124 21732	10µF 20% 25V
2603	2238 586 59812	0603 50V 100NP80M
2604	5322 126 11583	10nF 10% 50V 0603
2605	4822 124 21732	10µF 20% 25V
2606	2238 586 59812	0603 50V 100NP80M
2607	4822 126 14225	56pF 5% 50V 0603

2608	4822 124 21732	10µF 20% 25V
2609	4822 126 14225	56pF 5% 50V 0603
2610	5322 126 11583	10nF 10% 50V 0603
2611	4822 124 80231	47µF 20% 16V
2612	4822 124 40769	4.7µF 20% 100V
2616	5322 126 11578	1nF 10% 50V 0603
2617	5322 126 11578	1nF 10% 50V 0603
2620	3198 016 33380	0603 50V 3P3 COL
2621	3198 016 33380	0603 50V 3P3 COL
2623	2238 586 59812	0603 50V 100NP80M
2626	4822 124 22652	2.2µF 20% 50V
2627	4822 124 22652	2.2µF 20% 50V
2713	4822 124 11946	22µF 20% 16V
2719	4822 126 13883	220pF 5% 50V
2720	4822 124 42234	100µF 20% 6.3V
2721	5322 122 33861	120pF 10% 50V
2722	5322 124 41379	2.2µF 20% 50V
2723	4822 126 13881	470pF 5% 50V
2724	2238 586 59812	0603 50V 100NP80M
2725	4822 122 33761	22pF 5% 50V
2727	2238 586 59812	0603 50V 100NP80M
2728	5322 126 11583	10nF 10% 50V 0603
2729	4822 124 21732	10µF 20% 25V
2730	4822 126 13879	220nF 20% 16V
2731	2020 552 94523	0603 50V 8P2 PM0P5
2732	4822 124 22652	2.2µF 20% 50V
2733	2238 586 59812	0603 50V 100NP80M
2734	5322 126 11578	1nF 10% 50V 0603
2737	4822 124 80483	47µF 20% 6.3V
2740	4822 124 22652	2.2µF 20% 50V
2741	5322 126 11578	1nF 10% 50V 0603
2742	5322 126 11578	1nF 10% 50V 0603
2932	2238 586 59812	0603 50V 100NP80M
2933	4822 124 80483	47µF 20% 6.3V
2934	2238 586 59812	0603 50V 100NP80M
2935	2238 586 59812	0603 50V 100NP80M
2936	4822 122 33761	22pF 5% 50V
2937	4822 122 33761	22pF 5% 50V
2938	2238 586 59812	0603 50V 100NP80M
2940	2238 586 59812	0603 50V 100NP80M
2941	4822 124 21732	10µF 20% 25V
2942	4822 126 14238	0603 50V 2N2 COL R
2943	4822 126 14508	180pF 5% 50V 0603
2944	4822 126 14238	0603 50V 2N2 COL R
2945	4822 126 14508	180pF 5% 50V 0603
2946	3198 017 41050	0603 10V 1µF COL R
2947	3198 017 41050	0603 10V 1µF COL R

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3001	4822 117 13613	2Ω2 5% 0603
3002	4822 117 13613	2Ω2 5% 0603
3003	4822 051 30103	10k 5% 0.062W
3004	4822 117 12139	22Ω 5% 0.062W
3005	4822 117 12139	22Ω 5% 0.062W
3006	4822 117 12139	22Ω 5% 0.062W
3007	4822 117 12925	47k 1% 0.063W 0603
3008	4822 051 30102	1k 5% 0.062W
3009	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3010	4822 117 13632	100k 1% 0603 0.62W
3011	4822 117 12917	1Ω 5% 0.062W CASE0603
3012	5322 117 13047	330Ω 1% 0.063W 0603 RC22H
3013	4822 117 12139	22Ω 5% 0.062W
3014	4822 051 30103	10k 5% 0.062W
3015	4822 117 13613	2Ω2 5% 0603
3017	4822 117 13613	2Ω2 5% 0603
3018	4822 117 12139	22Ω 5% 0.062W
3019	4822 117 12139	22Ω 5% 0.062W
3020	4822 117 12139	22Ω 5% 0.062W
3024	4822 117 12925	47k 1% 0.063W 0603
3026	4822 117 12925	47k 1% 0.063W 0603
3027	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3029	4822 117 12917	1Ω 5% 0.062W CASE0603
3030	5322 117 13047	330Ω 1% 0.063W 0603 RC22H
3034	4822 117 12925	47k 1% 0.063W 0603
3035	4822 050 21003	10k 1% 0.6W
3039	4822 050 21003	10k 1% 0.6W
3041	4822 050 21003	10k 1% 0.6W
3043	4822 117 12139	22Ω 5% 0.062W
3044	4822 051 30472	4k7 5% 0.062W
3045	4822 117 13632	100k 1% 0603 0.62W
3046	4822 051 30471	470Ω 5% 0.062W
3047	4822 117 13632	100k 1% 0603 0.62W
3048	4822 051 30101	100Ω 5% 0.062W
3049	4822 051 30472	4k7 5% 0.062W
3050	4822 117 13632	100k 1% 0603 0.62W
3051	4822 051 30223	22k 5% 0.062W
3052	4822 051 30332	3k3 5% 0.062W
3053	4822 117 13632	100k 1% 0603 0.62W
3054	4822 051 30332	3k3 5% 0.062W
3300▲	4822 053 21335	3M3 5% 0.5W

3301▲	4822 053 21335	3M3 5% 0.5W
3302	4822 051 30102	1k 5% 0.062W
3303	4822 051 30102	1k 5% 0.062W
3304▲	4822 051 30103	10k 5% 0.062W
3305▲	4822 053 21684	680k 5% 0.5W
3306	4822 116 83872	220Ω 5% 0.5W
3307	4822 051 30103	10k 5% 0.062W
3308	4822 116 52272	330k 5% 0.5W
3309	4822 116 52272	330k 5% 0.5W
3310	4822 116 52272	330k 5% 0.5W
3311	4822 051 30102	1k 5% 0.062W
3312	4822 051 30221	220Ω 5% 0.062W
3313	4822 116 52234	100k 5% 0.5W
3314	4822 117 13611	1k 1% 0603 ERJ3Ω
3315	4822 117 12902	8k2 1% 0.063W 0603
3316	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3317	4822 051 30102	1k 5% 0.062W
3318	4822 116 52175	100Ω 5% 0.5W
3321	2322 193 14477	RST MFLM PR01 A 0Ω47 PM5 A
3323	4822 117 12891	220k 1% ERJ3Ω
3324	2322 702 60564	RST SMD 0603 560k 5%
3325	4822 117 12925	47k 1% 0.063W 0603
3326▲	4822 116 52175	100Ω 5% 0.5W
3327	4822 051 30105	1M 5% 0.062W
3328	4822 051 30103	10k 5% 0.062W
3329	3198 021 32250	RST SM 0603 2M 2 PM5 COL R
3330	4822 051 30471	470Ω 5% 0.062W
3331	4822 051 30109	10Ω 5% 0.062W
3332	2120 108 93941	RST SM 0603 MCR03 5k62 PM1 R
3333	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3335	4822 051 30471	470Ω 5% 0.062W
3336	4822 051 30471	470Ω 5% 0.062W
3337	4822 051 30102	1k 5% 0.062W
3338	4822 051 30221	220Ω 5% 0.062W
3339	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3340	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3341	4822 051 30683	68k 5% 0.062W
3342	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3343	5322 117 13026	4k7 1% 0.063W 0603 RC22H
3344	4822 051 30683	68k 5% 0.062W
3346	4822 051 30222	2k2 5% 0.062W
3347	4822 051 30472	4k7 5% 0.062W
3348	4822 051 30681	680Ω 5% 0.062W
3349	4822 051 30479	47Ω 5% 0.062W
3350	4822 051 30102	1k 5% 0.062W
3351	2322 702 60564	RST SMD 0603 560k 5%
3352	2322 193 14687	RST MFLM PR01 A 0Ω68 PM5
3353	4822 051 30272	2k7 5% 0.062W
3354	4822 051 30272	2k7 5% 0.062W
3355	4822 051 30479	47Ω 5% 0.062W
3356	4822 116 52228	680Ω 5% 0.5W
3357	4822 051 30472	4k7 5% 0.062W
3358	4822 051 30109	10Ω 5% 0.062W
3360	4822 116 52231	820Ω 5% 0.5W
3361	4822 051 30102	1k 5% 0.062W
3362	4822 051 30681	680Ω 5% 0.062W
3363	4822 051 30222	2k2 5% 0.062W
3364	4822 051 30103	10k 5% 0.062W
3365	4822 051 30332	3k3 5% 0.062W
3366	4822 051 30152	1k5 5% 0.063W 0603
3367	4822 117 12903	1k8 1% 0.063W 0603
3368	4822 051 30332	3k3 5% 0.062W
3371	4822 051 30479	47Ω 5% 0.062W
3372	4822 051 30339	33Ω 5% 0.062W
3373	4822 051 30339	33Ω 5% 0.062W
3401	4822 051 30152	75Ω 1% 0.062W
3402	4822 051 30152	75Ω 1% 0.062W
3403	4822 051 30152	75Ω 1% 0.062W
3404	4822 051 30759	75Ω 5% 0.062W
3405	4822 051 30223	22k 5% 0.062W
3406	4822 117 12891	220k 1% ERJ3Ω
3407	4822 051 30332	3k3 5% 0.062W
3408	4822 051 30392	3k9 5% 0.063W 0603
3409	4822 051 30152	75Ω 1% 0.062W
3410	4822 051 30152	75Ω 1% 0.062W
3411	4822 051 30759	75Ω 5% 0.062W
3412	4822 116 52201	75Ω 5% 0.5W
3413	4822 051 30152	75Ω 1% 0.062W
3414	4822 051 30759	75Ω 5% 0.062W
3415	4822 051 30102	1k 5% 0.062W
3416	4822 051 30472	4k7 5% 0.062W
3417	4822 051 30759	75Ω 5% 0.062W
3418	4822 117 13632	100k 1% 0603 0.62W
3419	4822 051 30223	22k 5% 0.062W
3420	4822 051 30151	150Ω 5% 0.062W
3421	4822 051 30273	27k 5% 0.062W
3422	4822 116 52231	820Ω 5% 0.5W
3423	4822 051 30391	390Ω 5% 0.062W
3424	4822 051 30333	33k 5% 0.062W
3425	4822 051 30471	470Ω 5% 0.062W

3426	4822 051 30333	33k 5% 0.062W
3427	4822 051 30759	75Ω 5% 0.062W
3428	4822 117 13632	100k 1% 0603 0.62W
3429	4822 117 12925	47k 1% 0.063W 0603
3431	4822 051 30472	4k7 5% 0.062W
3432	4822 116 52175	100Ω 5% 0.5W
3433	4822 116 52175	100Ω 5% 0.5W
3434	4822 116 52283	4k7 5% 0.5W
3435	4822 116 52201	75Ω 5% 0.5W
3436	4822 116 52199	68Ω 5% 0.5W
3437	4822 051 30103	10k 5% 0.062W
3438	4822 051 30103	10k 5% 0.062W
3439	4822 051 30103	10k 5% 0.062W
3440	4822 051 30103	10k 5% 0.062W
3441	4822 116 52201	75Ω 5% 0.5W
3442	4822 051 30154	150k 5% 0.062W
3443	4822 117 13632	100k 1% 0603 0.62W
3444	4822 117 13632	100k 1% 0603 0.62W
3445	4822 051 30151	150Ω 5% 0.062W
3446	4822 117 12925	47k 1% 0.063W 0603
3447	4822 116 83884	47k 5% 0.5W
3448	4822 051 30471	470Ω 5% 0.062W
3449	4822 051 30151	150Ω 5% 0.062W
3450	4822 051 30471	470Ω 5% 0.062W
3451	4822 050 21003	10k 1% 0.6W
3452	4822 051 30151	150Ω 5% 0.062W
3454	4822 050 11002	1k 1% 0.4W
3455	4822 051 30103	10k 5% 0.062W
3458	4822 051 30472	4k7 5% 0.062W
3459	4822 051 30103	10k 5% 0.062W
3460	4822 051 30472	4k7 5% 0.062W
3461	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3462	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3463	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3464	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3465	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3466	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3467	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3468	2322 574 10402	VDR 0805 1M A/6V4 MAX 21VR
3469	4822 117 13632	100k 1% 0603 0.62W
3470	4822 117 13632	100k 1% 0603 0.62W
3471	4822 117 13632	100k 1% 0603 0.62W
3472	4822 117 13632	100k 1% 0603 0.62W
3473	4822 051 30101	100Ω 5% 0.062W
3474	4822 051 30101	100Ω 5% 0.062W
3475	4822 051 30101	100Ω 5% 0.062W
3476	4822 051 30101	100Ω 5% 0.062W
3477	4822 051 30101	100Ω 5% 0.062W
3478	4822 051 30101	100Ω 5% 0.062W
3487	4822 117 13632	100k 1% 0603 0.62W
3488	4822 117 13632	100k 1% 0603 0.62W
3489	4822 117 12864	82k 5% 0.6W
3490	4822 051 30151	150Ω 5% 0.062W
3491	4822 051 30151	150Ω 5% 0.062W
3492	4822 051 30151	150Ω 5% 0.062W
3493	4822 051 30151	150Ω 5% 0.062W
3494	4822 051 30151	150Ω 5% 0.062W
3495	4822 051 30472	4k7 5% 0.062W
3496	4822 051 30472	4k7 5% 0.062W
3501	4822 051 30102	1k 5% 0.062W
3502	4822 050 11002	1k 1% 0.4W
3503	4822 117 13632	100k 1% 0603 0.62W
3504	4822 117 13632	100k 1% 0603 0.62W
3505	4822 117 13632	100k 1% 0603 0.62W
3506	4822 117 13632	100k 1% 0603 0.62W
3507	4822 117 13632	100k 1% 0603 0.62W
3508	4822 051 30102	1k 5% 0.062W
3509	4822 050 11002	1k 1% 0.4W
3510	4822 117 13632	100k 1% 0603 0.62W
3511	4822 117 13632	100k 1% 0603 0.62W
3512	4822 051 30102	1k 5% 0.062W
3513	4822 051 30102	1k 5% 0.062W
3514	4822 117 13632	100k 1% 0603 0.62W
3515	4822 050 11002	1k 1% 0.4W
3516	4822 117 13632	100k 1% 0603 0.62W
3517	4822 116 52283	4k7 5% 0.5W
3518	4822 051 30102	1k 5% 0.062W
3519	4822 116 52283	4k7 5% 0.5W
3520	4822 051 30221	220Ω 5% 0.062W
3521	4822 051 30221	220Ω 5% 0.062W
3522	4822 051 30221	220Ω 5% 0.062W
3523	4822 050 11002	1k 1% 0.4W
3524	4822 117 12968	820Ω 5% 0.62W
3525	4822 051 30221	220Ω 5% 0.062W
3526	4822 051 30102	1k 5% 0.062W
3527	4822 117 12968	820Ω 5% 0.62W

3528	4822 051 30472	4k7 5% 0.062W
3529	4822 051 30472	4k7 5% 0.062W
3530	4822 117 12968	820Ω 5% 0.62W
3531	4822 117 12968	820Ω 5% 0.62W
3532	4822 050 11002	1k 1% 0.4W
3533	4822 050 11002	1k 1% 0.4W
3534	4822 117 13632	100k 1% 0603 0.62W
3580	4822 051 30759	75Ω 5% 0.062W
3581	4822 051 30222	2k2 5% 0.062W
3582	4822 051 30331	330Ω 5% 0.062W
3584	4822 051 30471	470Ω 5% 0.062W
3585	4822 051 30561	560Ω 5% 0.062W
3600	4822 051 30103	10k 5% 0.062W
3601	4822 116 52175	100Ω 5% 0.5W
3602	4822 051 30472	4k7 5% 0.062W
3603	4822 116 52175	100Ω 5% 0.5W
3606	4822 051 30102	1k 5% 0.062W
3607	4822 051 30102	1k 5% 0.062W
3611	4822 051 30101	100Ω 5% 0.062W
3612	4822 051 30101	100Ω 5% 0.062W
3701	4822 116 52228	680Ω 5% 0.5W
3702	4822 051 30471	470Ω 5% 0.062W
3703	4822 116 52245	150k 5% 0.5W
3704	4822 051 30221	220Ω 5% 0.062W
3705	4822 051 30103	10k 5% 0.062W
3710	4822 051 30562	5k6 5% 0.063W 0603 RC21 RST SM
3711	4822 051 30333	33k 5% 0.062W
3714	4822 051 30183	18k 5% 0.062W
3715	4822 051 30103	10k 5% 0.062W
3716	4822 051 30472	4k7 5% 0.062W
3717	4822 051 30472	4k7 5% 0.062W
3720	4822 051 30331	330Ω 5% 0.062W
3724	4822 100 12158	22k 30%
3725	4822 117 12902	8k2 1% 0.063W 0603
3726	4822 051 30101	100Ω 5% 0.062W
3727	4822 117 12917	1Ω 5% 0.062W CASE0603
3728	4822 051 30101	100Ω 5% 0.062W
3729	4822 117 12917	1Ω 5% 0.062W CASE0603
3730	4822 051 30472	4k7 5% 0.062W
3731	4822 051 30271	270Ω 5% 0.062W
3731	4822 051 30331	330Ω 5% 0.062W
3732	4822 051 30102	1k 5% 0.062W
3733	4822 051 30472	4k7 5% 0.062W
3734	4822 051 30272	2k7 5% 0.062W
3735	4822 051 30332	3k3 5% 0.062W
3736	4822 051 30331	330Ω 5% 0.062W
3737	4822 051 30222	2k2 5% 0.062W
3738	4822 051 30682	6k8 5% 0.062W
3739	4822 051 30562	5k6 5% 0.063W 0603 RC21 RST SM
3740	4822 051 30681	680Ω 5% 0.062W
3741	4822 051 30472	4k7 5% 0.062W
3742	4822 051 30472	4k7 5% 0.062W
3743	4822 051 30563	56k 5% 0.062W
3744	4822 117 13632	100k 1% 0603 0.62W
3745	4822 051 30562	5k6 5% 0.063W 0603 RC21 RST SM
3746	4822 051 30562	5k6 5% 0.063W 0603 RC21 RST SM
3758	4822 051 30103	10k 5% 0.062W
3931	4822 117 12925	47k 1% 0.063W 0603
3932	4822 117 12925	47k 1% 0.063W 0603
3933	4822 117 12925	47k 1% 0.063W 0603
3934	4822 051 30101	100Ω 5% 0.062W
3935	4822 051 30101	100Ω 5% 0.062W
3936	4822 051 30103	10k 5% 0.062W
3937	4822 051 30222	2k2 5% 0.062W
3938	4822 051 30222	2k2 5% 0.062W
3939	4822 051 30472	4k7 5% 0.062W
3940	3198 021 31060	RST SM 0603 10M PM5COL R
3941	3198 021 31060	RST SM 0603 10M PM5COL R
3942	4822 051 30333	33k 5% 0.062W
3943	4822 051 30333	33k 5% 0.062W
3944	4822 051 30333	33k 5% 0.062W
3945	4822 051 30333	33k 5% 0.062W
3946	4822 051 30333	33k 5% 0.062W
3947	4822 051 30333	33k 5% 0.062W
3948	4822 051 30472	4k7 5% 0.062W
3950	4822 117 13632	100k 1% 0603 0.62W
3951	4822 051 30223	22k 5% 0.062W
3952	4822 051 30153	15k 5% 0.062W
3953	4822 051 30472	4k7 5% 0.062W
3954	4822 051 30472	4k7 5% 0.062W
3955	4822 051 30103	10k 5% 0.062W

5001	4822 157 11074	100µH
5300▲	2422 531 02546	TFM SMT SLOT SRW28EC9-E01V0* B

5302▲	2422 549 44509	MAINS 25mH 0A4 HF2022R Y	
5304	4822 157 70826	2.4µH	
5305	4822 157 70826	2.4µH	
5306	2422 535 94634	IND FXD LHL08 S 2U2 PM20 A	
5307	4822 157 11737	22µH 10% 9X9.5	
5308	4822 157 11737	22µH 10% 9X9.5	
5309	4822 157 11737	22µH 10% 9X9.5	
5401	4822 157 11706	10µH 5% 2.4X3.4	
5402	4822 157 11706	10µH 5% 2.4X3.4	
5403	4822 157 11706	10µH 5% 2.4X3.4	
5404	4822 157 11706	10µH 5% 2.4X3.4	
5406	4822 157 11706	10µH 5% 2.4X3.4	
5580	2422 536 00019	TRANSFORMER 6RG (SAGA) B	
5581	4822 157 11706	10µH 5% 2.4X3.4	
5600▲	4822 157 11706	10µH 5% 2.4X3.4	
5601▲	4822 157 11706	10µH 5% 2.4X3.4	
5602▲	4822 157 11706	10µH 5% 2.4X3.4	
5705	4822 157 11139	6.8µH 5%	
5709	4822 157 11139	6.8µH 5%	
5710	2422 549 44162	IND VAR 7MM Y 77M8 B	
5711	2422 549 44162	IND VAR 7MM Y 77M8 B	
5713	4822 157 11747	15µH 5%	
5714	4822 157 11747	15µH 5%	
5931	4822 157 11706	10µH 5% 2.4X3.4	
5932	4822 157 11074	100µH	

6001	4822 130 83757	MCL4148	
6002	4822 130 83757	MCL4148	
6003	4822 130 83757	MCL4148	
6300	9322 182 65682	DIO REC STTH302-C2 (ST00) B	
6301	4822 130 31603	1N4006	
6302	4822 130 31603	1N4006	
6303	9322 182 65682	DIO REC STTH302-C2 (ST00) B	
6304	4822 130 31878	1N4003G	
6305	4822 130 31603	1N4006	
6306	4822 130 31603	1N4006	
6307	9322 161 77682	DIO REC SB540L-7024 (GI00) B	
6308	9322 161 77682	DIO REC SB540L-7024 (GI00) B	
6309	9322 126 71673	DIO REC BYT42M A (TEG0) A	
6310	9322 182 65682	DIO REC STTH302-C2 (ST00) B	
6311	4822 130 31878	1N4003G	
6312	9322 129 38685	DIO REG SM BZM55-C6V8 (TEG0)	
6313	4822 130 10871	SBYV27-200	
6314	9322 129 39685	BZM55-C8V2	
6315	4822 130 83757	MCL4148	
6316	4822 130 30842	BAV21	
6317	4822 130 42488	BYD33D	
6318	3198 010 53390	DIO REG BZX79-B33 A COL A	
6319	4822 130 42488	BYD33D	
6320	4822 130 11397	BAS316	
6321	4822 130 10654	BAT254	
6322	9322 129 38685	DIO REG SM BZM55-C6V8 (TEG0)	
6324	4822 130 82346	BZV55-C27	
6325	4822 130 10871	SBYV27-200	
6401	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6402	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6403	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6404	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6409	9322 129 38685	DIO REG SM BZM55-C6V8 (TEG0)	
6414	9322 129 38685	DIO REG SM BZM55-C6V8 (TEG0)	
6415	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6416	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6417	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6418	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6419	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6420	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6422	9322 129 34685	DIO REG SM BZM55-C3V9 (TEGO)	
6423	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6424	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6425	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6426	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6427	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6428	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6429	9340 548 61115	DIO REG SM PDZ12B (PHSE) R	
6600	4822 130 83757	MCL4148	
6703	9340 552 30115	DIO SIG SM BA591 (PHSE)	
6704	9340 552 30115	DIO SIG SM BA591 (PHSE)	
6705	9340 552 30115	DIO SIG SM BA591 (PHSE)	

7001	9352 668 47118	IC SM UDA1334BTS/N2 (PHSE) R	
7002	4822 209 62312	MC33078D	
7003	4822 130 60854	DTA124EU-W	
7005	9352 670 99118	IC SM UDA1361TS/N1 (PHSE) R	
7006	3198 010 42320	BC857BW	
7008	3198 010 42310	BC847BW	
7009	3198 010 42310	BC847BW	
7010	4822 130 61553	DTC124EU	
7011	3198 010 42320	BC857BW	
7301	4822 209 14933	TL431IZ	
7302	9322 163 75685	FET SIG SM SI2306DS(VISH)	
7303	9322 183 38668	FET POW SM STS9NF30L (ST00)	
7304	4822 209 14933	TL431IZ	
7305	4822 209 14933	TL431IZ	
7306	4822 130 61553	DTC124EU	
7307	9322 157 37687	FET POW STP3NC60FP (ST00) L	
7308	4822 130 61553	DTC124EU	
7309	9322 180 12685	FET POW SM SI2312DS (VISH) R	
7310	3198 010 42310	BC847BW	
7311	3198 010 42310	BC847BW	
7312	4822 130 41782	BF422	
7313	9352 673 56112	IC TEA1507P/N1 (PHSE) L	
7314▲	9965 000 09548	PHOTOCOUPLER TCET1108G VISHAY	
7315	4822 209 14933	TL431IZ	
7317	9322 163 75685	FET SIG SM SI2306DS(VISH)	
7318	9322 163 75685	FET SIG SM SI2306DS(VISH)	
7319	5322 130 60159	BC846B	
7320	9322 163 75685	FET SIG SM SI2306DS(VISH)	
7321	4822 130 61553	DTC124EU	
7322	3198 010 42320	BC857BW	
7401	3198 010 42320	BC857BW	
7402	3198 010 42310	BC847BW	
7403	3198 010 42320	BC857BW	
7404	3198 010 42320	BC857BW	
7405	3198 010 42310	BC847BW	
7406	3198 010 42320	BC857BW	
7407	3198 010 42310	BC847BW	
7408	9322 173 41668	IC SM ST6618 (ST00)R	
7409	3198 010 42310	BC847BW	
7410	9965 000 03392	NJM2267M	
7411	9322 179 71668	IC SM NJM2285M (JRC0) R	
7412	4822 130 61553	DTC124EU	
7415	4822 130 42804	BC817-25	
7416	4822 130 42804	BC817-25	
7419	9340 560 36235	BSH111	
7420	9340 560 36235	BSH111	
7421	3198 010 42310	BC847BW	
7501	5322 209 11102	HEF4052BT	
7502	4822 209 32071	MC33079D	
7503	5322 209 11102	HEF4052BT	
7504	5322 209 11102	HEF4052BT	
7505	4822 209 62312	MC33078D	
7506	4822 130 42804	BC817-25	
7508	4822 130 42804	BC817-25	
7509	4822 130 42804	BC817-25	
7511	4822 130 42804	BC817-25	
7580	5322 209 11517	PC74HCU04T	
7600	9322 167 63668	IC SM MSP3415G-QG-B8 (MIAS) R	
7701	4822 130 61553	DTC124EU	
7702	4822 130 61553	DTC124EU	
7704	4822 130 61553	DTC124EU	
7705	4822 130 61553	DTC124EU	
7706	4822 130 61553	DTC124EU	
7710	9352 606 11118	IC SM TDA9818T/V1(PHSE) R	
7710	9352 621 13118	IC SM TDA9817T/V1(PHSE) R	
7711	3198 010 42320	BC857BW	
7712	4822 130 61553	DTC124EU	
7713	3198 010 42320	BC857BW	
7714	3198 010 42310	BC847BW	
7716	3198 010 42320	BC857BW	
7717	5322 130 42755	BC847C	
7931	4822 209 17505	STV5348D	
7932	3198 010 42310	BC847BW	
7933	3198 010 42310	BC847BW	
7934	4822 209 60177	LM339D	

UPC12 Sub PWB

Various

1801	2422 543 01115	RES XTL SM 24M576 12P CX-11F R	
1805	4822 242 70938	TA252E00 (32,768KHZ)	
1980	2422 025 17723	CON BM V 8P M2.00 C36 B	
1984	2422 025 17723	CON BM V 8P M2.00 C36 B	
1986	2422 025 16677	CON BM H 10P F 1.00 FFC SMT R	
1987	2422 025 17723	CON BM V 8P M2.00 C36 B	
1988	2422 025 17723	CON BM V 8P M2.00 C36 B	

2600	2238 586 59812	0603 50V 100NP80M	
2601	4822 122 33752	15pF 5% 50V	
2602	4822 122 33752	15pF 5% 50V	
2603	2238 586 59812	0603 50V 100NP80M	
2604	2238 586 59812	0603 50V 100NP80M	
2605	2238 586 59812	0603 50V 100NP80M	
2606	2238 586 59812	0603 50V 100NP80M	
2607	4822 126 13879	220nF 20% 16V	
2608	2238 586 59812	0603 50V 100NP80M	
2609	2238 586 59812	0603 50V 100NP80M	
2610	4822 122 33741	10pF 10% 50V	
2611	4822 122 33741	10pF 10% 50V	
2612	5322 126 11583	10nF 10% 50V 0603	
2613	4822 122 33741	10pF 10% 50V	
2614	4822 122 33741	10pF 10% 50V	
2615	4822 126 13883	220pF 5% 50V	
2616	4822 124 11968	220mF 20% 5.5V	
2617	2238 586 59812	0603 50V 100NP80M	
2618	4822 126 13883	220pF 5% 50V	
2619	4822 124 42234	100µF 20% 6.3V	
2620	5322 126 11583	10nF 10% 50V 0603	
2621	5322 126 11583	10nF 10% 50V 0603	
2622	2238 586 59812	0603 50V 100NP80M	
2623	5322 126 11578	1nF 10% 50V 0603	
2624	3198 017 41050	0603 10V 1µF COL R	
2625	2020 552 94427	0603 50V 100P PM5 R	
2628	2238 586 59812	0603 50V 100NP80M	
2629	4822 124 21732	10µF 20% 25V	
2630	2238 586 59812	0603 50V 100NP80M	
2631	5322 126 11583	10nF 10% 50V 0603	

3800	4822 051 30223	22k 5% 0.062W	
3801	4822 051 30103	10k 5% 0.062W	
3802	4822 051 30223	22k 5% 0.062W	
3803	4822 051 30102	1k 5% 0.062W	
3804	4822 051 30103	10k 5% 0.062W	
3805	4822 051 30101	100Ω 5% 0.062W	
3806	4822 051 30223	22k 5% 0.062W	
3807	4822 117 13632	100k 1% 0603 0.62W	
3808	4822 117 13632	100k 1% 0603 0.62W	
3809	4822 117 13632	100k 1% 0603 0.62W	
3810	4822 117 13632	100k 1% 0603 0.62W	
3811	4822 051 30101	100Ω 5% 0.062W	
3812	4822 051 30223	22k 5% 0.062W	
3813	4822 051 30103	10k 5% 0.062W	
3814	4822 051 30103	10k 5% 0.062W	
3815	4822 051 30183	18k 5% 0.062W	
3816	4822 051 30103	10k 5% 0.062W	
3817	4822 051 30103	10k 5% 0.062W	
3818	4822 051 30103	10k 5% 0.062W	
3819	4822 051 30103	10k 5% 0.062W	
3820	4822 051 30102	1k 5% 0.062W	
3821	4822 051 30103	10k 5% 0.062W	
3822	4822 051 30103	10k 5% 0.062W	

3823	4822 117 13632	100k 1% 0603 0.62W	
3824	4822 051 30102	1k 5% 0.062W	
3825	4822 051 30101	100Ω 5% 0.062W	
3826	4822 051 30102	1k 5% 0.062W	
3827	4822 051 30102	1k 5% 0.062W	
3828	4822 051 30103	10k 5% 0.062W	
3829	4822 051 30103	10k 5% 0.062W	
3830	4822 051 30102	1k 5% 0.062W	
3831	4822 051 30102	1k 5% 0.062W	
3832	4822 051 30333	33k 5% 0.062W	
3833	4822 051 30102	1k 5% 0.062W	
3834	4822 051 30102	1k 5% 0.062W	
3835	4822 051 30102	1k 5% 0.062W	
3836	4822 051 30101	100Ω 5% 0.062W	
3837	4822 051 30123	12k 5% 0.062W	
3838	4822 051 30102	1k 5% 0.062W	
3839	4822 051 30273	27k 5% 0.062W	
3840	4822 051 30472	4k7 5% 0.062W	
3841	4822 117 13632	100k 1% 0603 0.62W	
3842	4822 117 12891	220k 1% ERJ3Ω	
3843	4822 051 30333	33k 5% 0.062W	
3844	4822 051 30221	220Ω 5% 0.062W	
3845	4822 051 30102	1k 5% 0.062W	
3846	4822 051 30333	33k 5% 0.062W	
3847	4822 051 30103	10k 5% 0.062W	
3849	4822 117 12925	47k 1% 0.063W 0603	
3850	4822 051 30183	18k 5% 0.062W	
3851	4822 051 30103	10k 5% 0.062W	
3852	4822 051 30103	10k 5% 0.062W	
3854	4822 051 30103	10k 5% 0.062W	
3855	4822 051 30471	470Ω 5% 0.062W	
3856	4822 051 30103	10k 5% 0.062W	
3857	4822 051 30103	10k 5% 0.062W	
3858	4822 117 13632	100k 1% 0603 0.62W	
3860	4822 051 30222	2k2 5% 0.062W	
3861	3198 021 32250	RST SM 0603 2M 2 PM5 COL R	
3862	4822 051 30103	10k 5% 0.062W	
3863	4822 117 13608	4.7Ω 5% 0603 0.0016W	
3864	4822 117 13608	4.7Ω 5% 0603 0.0016W	
3865	4822 117 13608	4.7Ω 5% 0603 0.0016W	
3866	4822 117 13608	4.7Ω 5% 0603 0.0016W	
3867	4822 051 30759	75Ω 5% 0.062W	
3868	4822 051 30103	10k 5% 0.062W	
3869	4822 051 30331	330Ω 5% 0.062W	
3870	4822 117 13632	100k 1% 0603 0.62W	
3871	4822 051 30103	10k 5% 0.062W	
3872	4822 051 30103	10k 5% 0.062W	
3873	4822 051 30472	4k7 5% 0.062W	
3876	4822 051 30103	10k 5% 0.062W	
3878	4822 051 30102	1k 5% 0.062W	
3879	4822 051 30102	1k 5% 0.062W	
3881	4822 117 12925	47k 1% 0.063W 0603	
3882	4822 117 12925	47k 1% 0.063W 0603	
3884	4822 051 30101	100Ω 5% 0.062W	
3885	4822 051 30101	100Ω 5% 0.062W	
3886	4822 051 30472	4k7 5% 0.062W	
3887	4822 051 30472	4k7 5% 0.062W	
3888	4822 051 30471	470Ω 5% 0.062W	
3889	4822 051 30183	18k 5% 0.062W	
3916	4822 051 30273	27k 5% 0.062W	
3917	2322 704 65603	RST SM 0603 RC22H 56k PM1 R	
3919	5322 117 13024	33k 1% 0.063W 0603 RC22H	
3920	4822 051 30562	5k6 5% 0.063W 0603 RC21 RST SM	
3921	4822 051 30471	470Ω 5% 0.062W	
3922	4822 051 30102	1k 5% 0.062W	
3923	4822 051 30103	10k 5% 0.062W	
3925	4822 117 12706	10k 1% 0.063W CASE0603 RC22H	
3927	4822 117 12864	82k 5% 0.6W	

5801	2422 549 44607	IND FXD SM EMI100mH z 600RR	
5802	2422 549 44607	IND FXD SM EMI100mH z 600RR	
5803	2422 549 44607	IND FXD SM EMI100mH z 600RR	
5804	2422 549 44607	IND FXD SM EMI100mH z 600RR	

6800	4822 130 11397	BAS316	
6801	9322 129 34685	DIO REG SM BZM55-C3V9 (TEGO)	
6802	4822 130 10654	BAT254	
6803	4822 130 10654	BAT254	
6804	4822 130 10654	BAT254	
6901	5322 130 34331	BAV70	
6903	5322 130 34331	BAV70	

7801	9352 190 00118	IC SM 74LVC573AD (PHSE) R	
7802	4822 130 61553	DTC124EU	
7803	9322 131 96668	IC SM CY62128VL-70SC (CYPR) R	
7804	3103 165 13721	IC TMP91CW12AF/LIRP1	
7805	9965 000 13398	M29W800AT-80N1/ AN110021	
7806	9322 163 26685	IC SM NCP301LSN30 (ONSE) R	
7807	4822 209 73652	PMBT2369	
7808	4822 209 16907	M24C16-MN6T	
7813	3198 010 42310	BC847BW	
7814	3198 010 42310	BC847BW	
7815	3198 010 42310	BC847BW	
7816	3198 010 42310	BC847BW	
7817	3198 010 42310	BC847BW	
7818	4822 130 60854	DTA124EU-W	
7821	9340 560 36235	BSH111	
7822	9340 560 36235	BSH111	
7825	8203 107 03690	IC LA7213	
7902	5322 209 82941	LM358D	

DVIO PWB DVDR890

Various

1101	2422 025 17106	CON BM H 4P F 0.8 IEEE R	
1102	2422 543 01115	RES XTL SM 24M576 12P CX-11F R	
1200	2422 543 01159	RES XTL SM 11M0592 20P DSX840	
1500	2422 025 17084	CON BM V 60P F 0.80 179161 R	

2146	2238 586 59812	0603 50V 100NP80M	
2147	2238 586 59812	0603 50V 100NP80M	
2148	2238 586 59812	0603 50V 100NP80M	
2149	2238 586 59812	0603 50V 100NP80M	
2150	2238 586 59812	0603 50V 100NP80M	
2151	2238 586 59812	0603 50V 100NP80M	
2152	2238 586 59812	0603 50V 100NP80M	
2153	2238 586 59812	0603 50V 100NP80M	
2154	2238 586 59812	0603 50V 100NP80M	
2155	2238 586 59812	0603 50V 100NP80M	
2156	2238 586 59812	0603 50V 100NP80M	
2157	2238 586 59812	0603 50V 100NP80M	
2158	3198 017 41050	0603 10V 1µF COL R	
2163	4822 126 14506	270pF 5% 50V 0603	
2170	4822 126 11663	12pF	
2171	4822 126 11663	12pF	
2173	4822 124 23002	10µF 16V	
2174	2238 586 59812	0603 50V 100NP80M	
2175	4822 124 23002	10µF 16V	
2176	2238 586 59812	0603 50V 100NP80M	
2177	2238 586 59812	0603 50V 100NP80M	
2178	2238 586 59812	0603 50V 100NP80M	
2181	4822 124 12095	100µF 20% 16V	
2182	4822 124 23002	10µF 16V	
2183	2238 586 59812	0603 50V 100NP80M	
2184	2238 586 59812	0603 50V 100NP80M	
2187	2238 586 59812	0603 50V 100NP80M	
2192	2238 586 59812	0603 50V 100NP80M	
2193	2238 586 59812	0603 50V 100NP80M	
2194	2238 586 59812	0603 50V 100NP80M	
2195	2238 586 59812	0603 50V 100NP80M	
2196	2238 586 59812	0603 50V 100NP80M	
2197	2238 586 59812	0603 50V 100NP80M	
2200	4822 126 11663	12pF	
2202	2238 586 59812	0603 50V 100NP80M	
2203	2238 586 59812	0603 50V 100NP80M	
2204	2238 586 59812	0603 50V 100NP80M	
2205	4822 126 11663	12pF	
2206	2020 552 94427	0603 50V 100P PM5 R	
2207	2238 586 59812	0603 50V 100NP80M	
2301	2238 586 59812	0603 50V 100NP80M	
2302	4822 124 80151	47µF 16V	
2303	2238 586 59812	0603 50V 100NP80M	
2304	2238 586 59812	0603 50V 100NP80M	
2305	2238 586 59812	0603 50V 100NP80M	
2306	2238 586 59812	0603 50V 100NP80M	
2307	2238 586 59812	0603 50V 100NP80M	
2308	2238 586 59812	0603 50V 100NP80M	
2309	2238 586 59812	0603 50V 100NP80M	
2310	2238 586 59812	0603 50V 100NP80M	
2311	2238 586 59812	0603 50V 100NP80M	
2312	2238 586 59812	0603 50V 100NP80M	
2313	2238 586 59812	0603 50V 100NP80M	
2314	4822 124 80151	47µF 16V	
2318	2238 586 59812	0603 50V 100NP80M	
2319	2238 586 59812	0603 50V 100NP80M	
2324	2238 586 59812	0603 50V 100NP80M	
2325	2238 586 59812	0603 50V 100NP80M	
2400	2238 586 59812	0603 50V 100NP80M	
2401	2238 586 59812	0603 50V 100NP80M	
2402	2238 586 59812	0603 50V 100NP80M	
2403	2238 586 59812	0603 50V 100NP80M	
2404	2238 586 59812	0603 50V 100NP80M	
2405	2238 586 59812	0603 50V 100NP80M	
2406	2238 586 59812	0603 50V 100NP80M	
2407	2238 586 59812	0603 50V 100NP80M	
2408	2238 586 59812	0603 50V 100NP80M	
2409	2238 586 59812	0603 50V 100NP80M	
2410	2238 586 59812	0603 50V 100NP80M	
2411	2238 586 59812	0603 50V 100NP80M	
2412	2238 586 59812	0603 50V 100NP80M	
2413	2238 586 59812	0603 50V 100NP80M	
2414	2238 586 59812	0603 50V 100NP80M	
2415	2238 586 59812	0603 50V 100NP80M	
2416	2238 586 59812	0603 50V 100NP80M	
2417	2238 586 59812	0603 50V 100NP80M	
2418	2238 586 59812	0603 50V 100NP80M	
2419	2238 586 59812	0603 50V 100NP80M	
2420	2238 586 59812	0603 50V 100NP80M	
2421	2238 586 59812	0603 50V 100NP80M	
2500	2238 586 59812	0603 50V 100NP80M	
2501	2238 586 59812	0603 50V 100NP80M	
2502	2238 586 59812	0603 50V 100NP80M	
2503	2238 586 59812	0603 50V 100NP80M	
2504	2238 586 59812	0603 50V 100NP80M	
2505	4822 124 80151	47µF 16V	
2506	2238 586 59812	0603 50V 100NP80M	
2507	4822 124 80151	47µF 16V	
2508	2238 586 59812	0603 50V 100NP80M	
2509	2238 586 59812	0603 50V 100NP80M	
2510	2238 586 59812	0603 50V 100NP80M	
2511	4822 124 80151	47µF 16V	
2512	4822 124 80151	47µF 16V	
2514	4822 124 80151	47µF 16V	
2515	4822 124 80151	47µF 16V	
2516	5322 126 11583	10nF 10% 50V 0603	
2517	5322 126 11583	10nF 10% 50V 0603	
2518	4822 124 80151	47µF 16V	
2519	2238 586 59812	0603 50V 100NP80M	

3100	4822 117 12925	47k 1% 0.063W 0603	
3101	4822 117 12925	47k 1% 0.063W 0603	
3102	4822 051 30103	10k 5% 0.062W	
3103	4822 051 30103	10k 5% 0.062W	
3104	4822 117 12925	47k 1% 0.063W 0603	
3105	4822 051 30109	10Ω 5% 0.062W	
3106	4822 051 30103	10k 5% 0.062W	
3107	4822 051 30109	10Ω 5% 0.062W	
3108	4822 051 30109	10Ω 5% 0.062W	
3109	4822 117 12925	47k 1% 0.063W 0603	
3110	4822 117 12925	47k 1% 0.063W 0603	
3113	4822 051 30103	10k 5% 0.062W	
3115	4822 051 30102	1k 5% 0.062W	
3116	4822 117 12917	1Ω 5% 0.062W CASE0603	
3117	4822 051 30109	10Ω 5% 0.062W	
3118	4822 117 12925	47k 1% 0.063W 0603	
3119	4822 117 12925	47k 1% 0.063W 0603	
3120	4822 117 12925	47k 1% 0.063W 0603	
3121	4822 117 12925	47k 1% 0.063W 0603	
3122	4822 117 12925	47k 1% 0.063W 0603	
3123	4822 117 12925	47k 1% 0.063W 0603	
3124	4822 117 12925	47k 1% 0.063W 0603	
3125	4822 117 12925	47k 1% 0.063W 0603	
3126	4822 117 12925	47k 1% 0.063W 0603	
3127	4822 117 12925	47k 1% 0.063W 0603	
3128	4822 117 12925	47k 1% 0.063W 0603	
3130	4822 117 12925	47k 1% 0.063W 0603	
3131	4822 117 12925	47k 1% 0.063W 0603	
3132	4822 117 12925	47k 1% 0.063W 0603	
3133	4822 051 30223	22k 5% 0.062W	
3134	4822 051 30223	22k 5% 0.062W	
3136	4822 117 12917	1Ω 5% 0.062W CASE0603	
3138	4822 051 30103	10k 5% 0.062W	
3140	4822 051 30103	10k 5% 0.062W	
3148	2322 704 66342	RST SM 0603 RC22H 6k34 PM1 R	
3164	2322 734 65609	RST SM 0805 RC12H 56Ω PM1 R	
3165	2322 734 65609	RST SM 0805 RC12H 56Ω PM1 R	

3171	4822 051 30109	10Ω 5% 0.062W
3172	4822 051 30109	10Ω 5% 0.062W
3173	2322 734 65609	RST SM 0805 RC12H 56Ω PM1 R
3174	4822 051 30109	10Ω 5% 0.062W
3176	4822 051 30109	10Ω 5% 0.062W
3177	2322 704 65102	RST SM 0603 RC22H 5k1 PM1
3178	2322 734 65609	RST SM 0805 RC12H 56Ω PM1 R
3179	4822 051 30103	10k 5% 0.062W
3188	4822 051 30479	47Ω 5% 0.062W
3189	4822 051 30109	10Ω 5% 0.062W
3190	4822 051 30479	47Ω 5% 0.062W
3191	4822 051 30109	10Ω 5% 0.062W
3192	4822 117 12925	47k 1% 0.063W 0603
3197	4822 117 12925	47k 1% 0.063W 0603
3198	4822 117 12925	47k 1% 0.063W 0603
3199	4822 117 12925	47k 1% 0.063W 0603
3201	4822 051 30479	47Ω 5% 0.062W
3202	4822 051 30103	10k 5% 0.062W
3203	4822 051 30102	1k 5% 0.062W
3204	4822 051 30103	10k 5% 0.062W
3205	4822 117 12925	47k 1% 0.063W 0603
3206	4822 117 12925	47k 1% 0.063W 0603
3223	4822 051 30472	4k7 5% 0.062W
3224	4822 051 30331	330Ω 5% 0.062W
3225	4822 051 30109	10Ω 5% 0.062W
3300	4822 051 30109	10Ω 5% 0.062W
3301	4822 051 30102	1k 5% 0.062W
3303	4822 051 30102	1k 5% 0.062W
3305	4822 051 30102	1k 5% 0.062W
3306	4822 051 30102	1k 5% 0.062W
3307	4822 051 30102	1k 5% 0.062W
3312	4822 051 30109	10Ω 5% 0.062W
3313	4822 051 30103	10k 5% 0.062W
3314	4822 051 30103	10k 5% 0.062W
3315	4822 051 30339	33Ω 5% 0.062W
3317	4822 051 30339	33Ω 5% 0.062W
3318	4822 051 30339	33Ω 5% 0.062W
3319	4822 051 30339	33Ω 5% 0.062W
3320	4822 051 30479	47Ω 5% 0.062W
3321	4822 051 30479	47Ω 5% 0.062W
3322	4822 051 30479	47Ω 5% 0.062W
3325	4822 051 30479	47Ω 5% 0.062W
3327	4822 051 30479	47Ω 5% 0.062W
3328	4822 051 30103	10k 5% 0.062W
3329	4822 051 30103	10k 5% 0.062W
3330	4822 051 30479	47Ω 5% 0.062W
3331	4822 051 30479	47Ω 5% 0.062W
3400	4822 051 30103	10k 5% 0.062W
3401	4822 117 13573	NETW 4 X 47Ω 5% MNR14
3402	4822 117 13573	NETW 4 X 47Ω 5% MNR14
3403	4822 051 30479	47Ω 5% 0.062W
3404	4822 051 30479	47Ω 5% 0.062W
3405	4822 051 30479	47Ω 5% 0.062W
3502	4822 051 30339	33Ω 5% 0.062W
3504	4822 117 13576	NETW 4 X 33Ω 5% 1206
3505	4822 117 13576	NETW 4 X 33Ω 5% 1206
3506	4822 051 30339	33Ω 5% 0.062W
3510	4822 051 30479	47Ω 5% 0.062W
3518	4822 051 30101	100Ω 5% 0.062W
3519	4822 051 30101	100Ω 5% 0.062W
3520	4822 117 12891	220k 1% ERJ3Q
3521	4822 117 12891	220k 1% ERJ3Q
3524	4822 051 30339	33Ω 5% 0.062W
3525	4822 051 30339	33Ω 5% 0.062W
3526	4822 051 30339	33Ω 5% 0.062W
3527	4822 051 30339	33Ω 5% 0.062W

5103	4822 157 11499	BLM11P600SPT
5106	4822 157 11499	BLM11P600SPT
5109	4822 157 11499	BLM11P600SPT
5110	4822 157 11499	BLM11P600SPT
5200	4822 157 11499	BLM11P600SPT
5300	4822 157 11499	BLM11P600SPT
5301	4822 157 11499	BLM11P600SPT
5302	4822 157 11499	BLM11P600SPT
5303	4822 157 11499	BLM11P600SPT
5304	4822 157 11499	BLM11P600SPT
5402	4822 157 11499	BLM11P600SPT
5403	4822 157 11499	BLM11P600SPT
5404	4822 157 11499	BLM11P600SPT
5500	4822 157 11499	BLM11P600SPT
5501	4822 157 11499	BLM11P600SPT
5502	4822 157 11499	BLM11P600SPT
5503	4822 157 11499	BLM11P600SPT

6300	4822 209 17398	LD1117DT33

7101	9352 683 02157	IC SM PDI1394P25BD (PHSE) Y
7103	9352 682 52557	IC SM PDI1394L40 (PHSE) Y
7201	4822 209 91023	UM62256EM-70LL
7202	5322 130 60159	BC846B
7204	9337 331 10215	FET SIG SM BST82 (PHSE) R
7207	5322 130 60159	BC846B
7208	9352 456 40115	IC SM 74HCT1G04GW (PHSE) R
7300	3104 123 96640	IC ROM XC17S30XL DVIO 1.5
7301	9322 166 64668	IC SM CY7C1019BV33-10VC(CYPR)R
7303	9322 169 90671	IC SM XCS30XL-4TQ144C (XILI) Y
7304	4822 242 10838	27MHZ 120P FX0-31FT
7307	3104 123 96620	IC FLASH PLL CY2071A DVIO 1.5
7308	3104 123 96620	IC FLASH PLL CY2071A DVIO 1.5
7402	9322 182 57668	MT4LC1M16E5DJ-5
7403	9322 182 57668	MT4LC1M16E5DJ-5
7404	9322 179 31671	IC SM NW700
7500	9352 424 20118	IC SM 74LVC04APW (PHSE) R
7505	9352 351 50118	IC SM 74LVC16244ADGG (PHSE) R
7506	9352 668 39118	IC SM UDA1334ATS/N2 (PHSE) R

Front DV Board DVDR890

Various

1000	2422 033 00363	CON BM H 4P F 0.8 B
1001	2422 025 17106	CON BM H 4P F 0.8 IEEE R

2000	5322 126 10511	1nF 5% 50V
2001	5322 126 10511	1nF 5% 50V
2002	2020 557 90732	250V 4N7 PM10 R
2002	2222 580 19815	50V 330nF P8020 R
2003	2020 557 90732	250V 4N7 PM10 R
2003	2222 580 19815	50V 330nF P8020 R
2004	2020 557 90732	250V 4N7 PM10 R
2005	2020 557 90732	250V 4N7 PM10 R
2204	2222 867 15339	0603 50V 33P PM5
2205	2222 867 15339	0603 50V 33P PM5

3000	4822 051 20105	1M 5% 0.1W

5000	2422 549 44768	IND FXD SM EMI 100mH z 90R R
5001	2422 549 44768	IND FXD SM EMI 100mH z 90R R

6000	4822 130 11395	TLMH3100
6001	9322 172 97668	DIO SUP SM6T39CA (ST00) R

Digital Board 1.5

Various

1100	2422 025 17018	CON BM V 15P F 1.00 FFC 0.3 R
1101	2422 025 17018	CON BM V 15P F 1.00 FFC 0.3 R
1200	2422 025 16794	CON BM V 7P F 1.00 FFC 0.3 R
1500	2422 543 01115	RES XTL SM 24M576 12P CX-11F R
1600	2422 025 16729	CON BM V 10P F 1.00 FFC 0.3 R
1601	2422 025 16389	CON BM V 22P F 1.00 FFC 0.3 R
1602	2422 025 16389	CON BM V 22P F 1.00 FFC 0.3 R
1603	2422 025 16939	CON BM V 60P F 0.80 84616 R

2100	2238 586 59812	0603 50V 100NP80M
2101	2238 586 59812	0603 50V 100NP80M
2102	2238 586 59812	0603 50V 100NP80M
2103	2238 586 59812	0603 50V 100NP80M
2104	2238 586 59812	0603 50V 100NP80M
2105	2238 586 59812	0603 50V 100NP80M
2106	2238 586 59812	0603 50V 100NP80M
2107	2238 586 59812	0603 50V 100NP80M
2108	2238 586 59812	0603 50V 100NP80M
2109	2238 586 59812	0603 50V 100NP80M
2110	2238 586 59812	0603 50V 100NP80M
2111	2238 586 59812	0603 50V 100NP80M
2112	2238 586 59812	0603 50V 100NP80M
2113	2238 586 59812	0603 50V 100NP80M
2114	2238 586 59812	0603 50V 100NP80M
2115	2238 586 59812	0603 50V 100NP80M
2116	2238 586 59812	0603 50V 100NP80M
2117	2238 586 59812	0603 50V 100NP80M
2118	2238 586 59812	0603 50V 100NP80M
2119	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2120	2238 586 59812	0603 50V 100NP80M
2121	2238 586 59812	0603 50V 100NP80M
2122	2238 586 59812	0603 50V 100NP80M
2123	2238 586 59812	0603 50V 100NP80M
2124	2238 586 59812	0603 50V 100NP80M
2125	2238 586 59812	0603 50V 100NP80M
2126	2238 586 59812	0603 50V 100NP80M
2127	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2128	3198 016 31020	0603 25V 1nF
2129	4822 126 13956	68pF 5% 63V CASE 0603
2130	3198 030 82280	EL SM 50V 2U2 PM20 COL R
2131	5322 124 41945	22µF 20% 35V
2132	2238 586 59812	0603 50V 100NP80M
2135	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2136	4822 126 11785	0603 50V 47P PM5
2137	2238 586 59812	0603 50V 100NP80M
2139	2238 586 59812	0603 50V 100NP80M
2141	4822 126 11785	0603 50V 47P PM5
2146	2238 586 59812	0603 50V 100NP80M
2200	3198 016 31020	0603 25V 1nF
2201	4822 126 14494	22nF 10% 25V 0603
2202	2238 586 59812	0603 50V 100NP80M
2203	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2204	2222 867 15339	0603 50V 33P PM5
2205	2238 586 59812	0603 50V 100NP80M
2206	2238 586 59812	0603 50V 100NP80M
2207	2222 867 15339	0603 50V 33P PM5
2208	2238 586 59812	0603 50V 100NP80M
2209	2238 586 59812	0603 50V 100NP80M
2210	2238 586 59812	0603 50V 100NP80M
2211	2238 586 59812	0603 50V 100NP80M
2212	2238 586 59812	0603 50V 100NP80M
2213	2238 586 59812	0603 50V 100NP80M
2214	2238 586 59812	0603 50V 100NP80M
2215	2238 586 59812	0603 50V 100NP80M
2216	2238 586 59812	0603 50V 100NP80M
2217	2238 586 59812	0603 50V 100NP80M
2218	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2220	2238 586 59812	0603 50V 100NP80M
2221	2238 586 59812	0603 50V 100NP80M
2222	2238 586 59812	0603 50V 100NP80M
2223	2238 586 59812	0603 50V 100NP80M
2224	2238 586 59812	0603 50V 100NP80M
2225	2238 586 59812	0603 50V 100NP80M
2226	2238 586 59812	0603 50V 100NP80M
2227	2238 586 59812	0603 50V 100NP80M
2228	2238 586 59812	0603 50V 100NP80M
2229	2238 586 59812	0603 50V 100NP80M
2230	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2231	2238 586 59812	0603 50V 100NP80M
2300	2238 586 59812	0603 50V 100NP80M
2301	2238 586 59812	0603 50V 100NP80M
2302	2238 586 59812	0603 50V 100NP80M
2303	2238 586 59812	0603 50V 100NP80M

2304	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2305	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2306	2238 586 59812	0603 50V 100NP80M
2307	2238 586 59812	0603 50V 100NP80M
2308	2238 586 59812	0603 50V 100NP80M
2309	2238 586 59812	0603 50V 100NP80M
2310	2238 586 59812	0603 50V 100NP80M
2311	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2312	2238 586 59812	0603 50V 100NP80M
2402	2238 586 59812	0603 50V 100NP80M
2403	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2404	2238 586 59812	0603 50V 100NP80M
2405	2238 586 59812	0603 50V 100NP80M
2406	2238 586 59812	0603 50V 100NP80M
2407	2238 586 59812	0603 50V 100NP80M
2408	2238 586 59812	0603 50V 100NP80M
2409	2238 586 59812	0603 50V 100NP80M
2410	2238 586 59812	0603 50V 100NP80M
2411	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2412	2238 586 59812	0603 50V 100NP80M
2413	2238 586 59812	0603 50V 100NP80M
2414	2238 586 59812	0603 50V 100NP80M
2415	2238 586 59812	0603 50V 100NP80M
2416	2238 586 59812	0603 50V 100NP80M
2417	2238 586 59812	0603 50V 100NP80M
2418	2238 586 59812	0603 50V 100NP80M
2419	2238 586 59812	0603 50V 100NP80M
2420	2238 586 59812	0603 50V 100NP80M
2421	2238 586 59812	0603 50V 100NP80M
2422	2238 586 59812	0603 50V 100NP80M
2423	2238 586 59812	0603 50V 100NP80M
2424	2238 586 59812	0603 50V 100NP80M
2425	2238 586 59812	0603 50V 100NP80M
2426	2238 586 59812	0603 50V 100NP80M
2427	2238 586 59812	0603 50V 100NP80M
2428	2238 586 59812	0603 50V 100NP80M
2429	2238 586 59812	0603 50V 100NP80M
2430	2238 586 59812	0603 50V 100NP80M
2431	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2432	2238 586 59812	0603 50V 100NP80M
2433	2238 586 59812	0603 50V 100NP80M
2434	2238 586 59812	0603 50V 100NP80M
2435	2238 586 59812	0603 50V 100NP80M
2436	2238 586 59812	0603 50V 100NP80M
2437	2238 586 59812	0603 50V 100NP80M
2438	2238 586 59812	0603 50V 100NP80M
2439	2238 586 59812	0603 50V 100NP80M
2440	2238 586 59812	0603 50V 100NP80M
2441	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2442	2238 586 59812	0603 50V 100NP80M
2443	4822 122 33741	10pF 10% 50V
2444	2238 586 59812	0603 50V 100NP80M
2446	3198 016 31020	0603 25V 1nF
2500	3198 016 31020	0603 25V 1nF
2501	2238 586 59812	0603 50V 100NP80M
2502	2238 586 59812	0603 50V 100NP80M
2503	2238 586 59812	0603 50V 100NP80M
2504	2238 586 59812	0603 50V 100NP80M
2505	2238 586 59812	0603 50V 100NP80M
2506	2238 586 59812	0603 50V 100NP80M
2507	2238 586 59812	0603 50V 100NP80M
2508	2238 586 59812	0603 50V 100NP80M
2509	2238 586 59812	0603 50V 100NP80M
2510	4822 122 33761	22pF 5% 50V
2510	4822 126 14507	18pF 5% 50V 0603
2511	4822 122 33741	10pF 10% 50V
2511	4822 126 14507	18pF 5% 50V 0603
2512	2238 586 59812	0603 50V 100NP80M
2513	2238 586 59812	0603 50V 100NP80M
2514	2238 586 59812	0603 50V 100NP80M
2515	2238 586 59812	0603 50V 100NP80M
2516	2238 586 59812	0603 50V 100NP80M
2517	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2518	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2519	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2520	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2521	2238 586 59812	0603 50V 100NP80M
2522	2238 586 59812	0603 50V 100NP80M
2523	2238 586 59812	0603 50V 100NP80M
2524	2238 586 59812	0603 50V 100NP80M
2525	2238 586 59812	0603 50V 100NP80M
2526	2238 586 59812	0603 50V 100NP80M
2527	2238 586 59812	0603 50V 100NP80M
2528	2238 586 59812	0603 50V 100NP80M
2529	2238 586 59812	0603 50V 100NP80M
2530	2238 586 59812	0603 50V 100NP80M
2531	2238 586 59812	0603 50V 100NP80M
2532	2238 586 59812	0603 50V 100NP80M
2533	2238 586 59812	0603 50V 100NP80M
2534	2238 586 59812	0603 50V 100NP80M
2535	2238 586 59812	0603 50V 100NP80M
2536	2238 586 59812	0603 50V 100NP80M
2537	2238 586 59812	0603 50V 100NP80M
2538	2238 586 59812	0603 50V 100NP80M
2539	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2540	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2541	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2542	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2543	2238 586 59812	0603 50V 100NP80M
2544	2238 586 59812	0603 50V 100NP80M
2565	4822 122 33753	150pF 5% 50V
2600	2238 586 59812	0603 50V 100NP80M
2601	4822 126 11785	0603 50V 47P PM5
2602	4822 126 11785	0603 50V 47P PM5
2605	2238 586 59812	0603 50V 100NP80M
2606	4822 126 11785	0603 50V 47P PM5
2607	4822 126 11785	0603 50V 47P PM5
2608	2238 586 59812	0603 50V 100NP80M
2609	2238 586 59812	0603 50V 100NP80M
2610	2238 586 59812	0603 50V 100NP80M
2611	4822 126 11785	0603 50V 47P PM5
2612	4822 126 11785	0603 50V 47P PM5
2613	2238 586 59812	0603 50V 100NP80M
2614	2238 586 59812	0603 50V 100NP80M
2615	2238 586 59812	0603 50V 100NP80M
2616	4822 126 11785	0603 50V 47P PM5
2617	4822 126 11785	0603 50V 47P PM5
2618	2238 586 59812	0603 50V 100NP80M
2619	2238 586 59812	0603 50V 100NP80M
2620	2238 586 59812	0603 50V 100NP80M
2621	4822 126 11785	0603 50V 47P PM5
2622	4822 126 11785	0603 50V 47P PM5
2625	2238 586 59812	0603 50V 100NP80M
2626	4822 126 11785	0603 50V 47P PM5
2627	4822 126 11785	0603 50V 47P PM5
2628	2238 586 59812	0603 50V 100NP80M
2629	2238 586 59812	0603 50V 100NP80M
2630	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2632	2238 586 59812	0603 50V 100NP80M
2633	2238 586 59812	0603 50V 100NP80M
2634	4822 126 14494	22nF 10% 25V 0603
2635	2238 586 59812	0603 50V 100NP80M
2636	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2722	2238 586 59812	0603 50V 100NP80M
2900	2238 586 59812	0603 50V 100NP80M
2901	2238 586 59812	0603 50V 100NP80M
2902	2238 586 59812	0603 50V 100NP80M
2903	2238 586 59812	0603 50V 100NP80M
2904	2238 586 59812	0603 50V 100NP80M
2906	2238 586 59812	0603 50V 100NP80M
2907	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2908	2238 586 59812	0603 50V 100NP80M
2909	4822 126 14247	0603 50V 1N5 COL R
2911	2238 586 59812	0603 50V 100NP80M
2912	4822 126 14247	0603 50V 1N5 COL R
2914	3198 030 74780	EL SM 35V 4U7 PM20 COL R
2915	2238 586 59812	0603 50V 100NP80M
2916	4822 126 14494	22nF 10% 25V 0603

3100	4822 051 30103	10k 5% 0.062W
3101	4822 051 30222	2k2 5% 0.062W
3102	4822 051 30103	10k 5% 0.062W
3104	4822 051 30479	47Ω 5% 0.062W
3105	4822 051 30479	47Ω 5% 0.062W
3106	4822 051 30479	47Ω 5% 0.062W
3107	4822 051 30109	10Ω 5% 0.062W
3108	4822 051 30479	47Ω 5% 0.062W
3109	4822 051 30479	47Ω 5% 0.062W
3110	4822 051 30479	47Ω 5% 0.062W
3111	4822 051 30472	4k7 5% 0.062W
3112	4822 051 30472	4k7 5% 0.062W
3113	4822 051 30472	4k7 5% 0.062W
3114	4822 051 30472	4k7 5% 0.062W
3115	4822 051 30103	10k 5% 0.062W
3116	4822 051 30103	10k 5% 0.062W
3117	4822 117 12139	22Ω 5% 0.062W
3118	4822 117 12139	22Ω 5% 0.062W
3119	4822 051 30222	2k2 5% 0.062W
3120	4822 051 30153	15k 5% 0.062W
3121	4822 117 12917	1Ω 5% 0.062W CASE0603
3122	4822 051 30123	12k 5% 0.062W
3123	2322 704 62002	RST SM 0603 RC22H 2k PM1 R
3124	2322 704 63002	RST SM 0603 RC22H 3k PM1 R
3125	4822 117 12139	22Ω 5% 0.062W
3126	4822 117 12891	220k 1% ERJ3Q
3127	4822 051 30479	47Ω 5% 0.062W
3128	4822 051 30479	47Ω 5% 0.062W
3129	4822 051 30479	47Ω 5% 0.062W
3130	2120 611 00019	NTC SM 0603 0W1 4k7 PM5 R
3131	4822 117 12917	1Ω 5% 0.062W CASE0603
3132	4822 117 12917	1Ω 5% 0.062W CASE0603
3133	4822 117 12917	1Ω 5% 0.062W CASE0603
3134	4822 117 12917	1Ω 5% 0.062W CASE0603
3135	4822 117 12917	1Ω 5% 0.062W CASE0603
3136	4822 117 12917	1Ω 5% 0.062W CASE0603
3137	4822 051 30472	4k7 5% 0.062W
3138	4822 051 30472	4k7 5% 0.062W
3200	4822 051 30332	3k3 5% 0.062W
3201	4822 051 30152	1k5 5% 0.062W
3202	4822 051 30103	10k 5% 0.062W
3203	4822 117 12139	22Ω 5% 0.062W
3204	4822 051 30101	100Ω 5% 0.062W
3205	4822 051 30101	100Ω 5% 0.062W
3206	4822 051 30101	100Ω 5% 0.062W
3207	4822 051 30103	10k 5% 0.062W
3208	4822 117 12139	22Ω 5% 0.062W
3209	4822 051 30103	10k 5% 0.062W
3211	4822 051 30222	2k2 5% 0.062W
3212	4822 051 30152	1k5 5% 0.062W
3213	4822 051 30103	10k 5% 0.062W
3214	4822 051 30103	10k 5% 0.062W
3215	4822 051 30103	10k 5% 0.062W
3216	4822 051 30103	10k 5% 0.062W
3217	4822 051 30101	100Ω 5% 0.062W
3218	4822 051 30101	100Ω 5% 0.062W
3219	4822 051 30103	10k 5% 0.062W
3220	4822 051 30103	10k 5% 0.062W
3221	4822 051 30103	10k 5% 0.062W
3222	4822 051 30103	10k 5% 0.062W
3223	4822 051 30222	2k2 5% 0.062W
3224	4822 051 30103	10k 5% 0.062W
3225	4822 051 30103	10k 5% 0.062W
3226	4822 051 30103	10k 5% 0.062W
3227	4822 117 12139	22Ω 5% 0.062W
3228	4822 117 12139	22Ω 5% 0.062W
3229	2322 704 61303	RST SM 0603 RC22H 13k PM1 R
3230	2322 704 61303	RST SM 0603 RC22H 13k PM1 R
3231	5322 117 13042	3k9 1% 0.063W 0603 RC22H
3232	5322 117 13042	3k9 1% 0.063W 0603 RC22H
3234	3198 031 14720	RST NETW 1206 4X4k7 PM5 COL R
3235	4822 117 12917	1Ω 5% 0.062W CASE0603
3236	4822 117 13576	NETW 4 X 33Ω 5% 1206
3237	4822 117 13576	NETW 4 X 33Ω 5% 1206
3300	4822 051 30479	47Ω 5% 0.062W
3301	4822 051 30479	47Ω 5% 0.062W
3400	4822 051 30101	100Ω 5% 0.062W
3401	4822 051 30101	100Ω 5% 0.062W
3403	4822 051 30103	10k 5% 0.062W
3404	4822 051 30008	0Ω jumper
3405	4822 051 30332	3k3 5% 0.062W
3406	4822 051 30479	47Ω 5% 0.062W
3407	4822 051 30181	180Ω 5% 0.062W
3408	4822 117 12139	22Ω 5% 0.062W
3409	4822 117 12139	22Ω 5% 0.062W
3410	4822 117 12139	22Ω 5% 0.062W
3500	4822 051 30101	100Ω 5% 0.062W
3501	4822 051 30101	100Ω 5% 0.062W
3502	4822 051 30222	2k2 5% 0.062W
3503	4822 051 30102	1k 5% 0.062W
3504	4822 051 30681	680Ω 5% 0.062W
3505	4822 117 12139	22Ω 5% 0.062W
3506	4822 051 30222	2k2 5% 0.062W
3507	4822 051 30472	4k7 5% 0.062W
3508	4822 051 30103	10k 5% 0.062W
3513	4822 051 30681	680Ω 5% 0.062W
3515	4822 117 12917	1Ω 5% 0.062W CASE0603
3600	2322 704 65609	RST SM 0603 RC22H 56Ω PM1 R
3601	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3602	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3603	4822 051 30102	1k 5% 0.062W
3604	4822 051 30101	100Ω 5% 0.062W

3605	4822 117 12917	1Ω 5% 0.062W CASE0603
3606	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3607	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3608	4822 051 30102	1k 5% 0.062W
3610	4822 117 12917	1Ω 5% 0.062W CASE0603
3611	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3612	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3613	4822 051 30102	1k 5% 0.062W
3615	4822 051 30101	100Ω 5% 0.062W
3616	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3617	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3618	4822 051 30102	1k 5% 0.062W
3619	4822 051 30561	560Ω 5% 0.062W
3620	4822 051 30222	2k2 5% 0.062W
3621	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3622	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3623	4822 051 30101	100Ω 5% 0.062W
3624	4822 051 30102	1k 5% 0.062W
3625	4822 051 30101	100Ω 5% 0.062W
3626	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3627	5322 117 13059	560Ω 1% 0.063W 0603 RC22H
3628	4822 051 30102	1k 5% 0.062W
3629	4822 051 30181	180Ω 5% 0.062W
3630	4822 051 30181	180Ω 5% 0.062W
3631	4822 117 12917	1Ω 5% 0.062W CASE0603
3632	4822 051 30561	560Ω 5% 0.062W
3633	4822 051 30561	560Ω 5% 0.062W
3635	4822 051 30101	100Ω 5% 0.062W
3636	4822 051 30181	180Ω 5% 0.062W
3637	4822 051 30101	100Ω 5% 0.062W
3638	4822 051 30222	2k2 5% 0.062W
3900	4822 051 30103	10k 5% 0.062W
3901	4822 117 12139	22Ω 5% 0.062W
3902	4822 117 12925	47k 1% 0.063W 0603
3903	4822 117 13632	100k 1% 0603 0.62W
3904	4822 117 12139	22Ω 5% 0.062W
3906	4822 051 30479	47Ω 5% 0.062W
3908	4822 117 12139	22Ω 5% 0.062W
3910	4822 051 30101	100Ω 5% 0.062W
3911	4822 051 30103	10k 5% 0.062W
3913	4822 051 30682	6k8 5% 0.062W
3914	4822 051 30479	47Ω 5% 0.062W
3915	4822 051 30479	47Ω 5% 0.062W
3916	4822 117 13632	100k 1% 0603 0.62W
3917	4822 117 12139	22Ω 5% 0.062W
3918	4822 117 13632	100k 1% 0603 0.62W
3919	4822 051 30101	100Ω 5% 0.062W
3920	4822 117 12139	22Ω 5% 0.062W
3921	4822 051 30103	10k 5% 0.062W
3922	4822 051 30682	6k8 5% 0.062W
3923	4822 117 13632	100k 1% 0603 0.62W
3924	4822 051 30152	1k5 5% 0.062W
3925	4822 051 30472	4k7 5% 0.062W

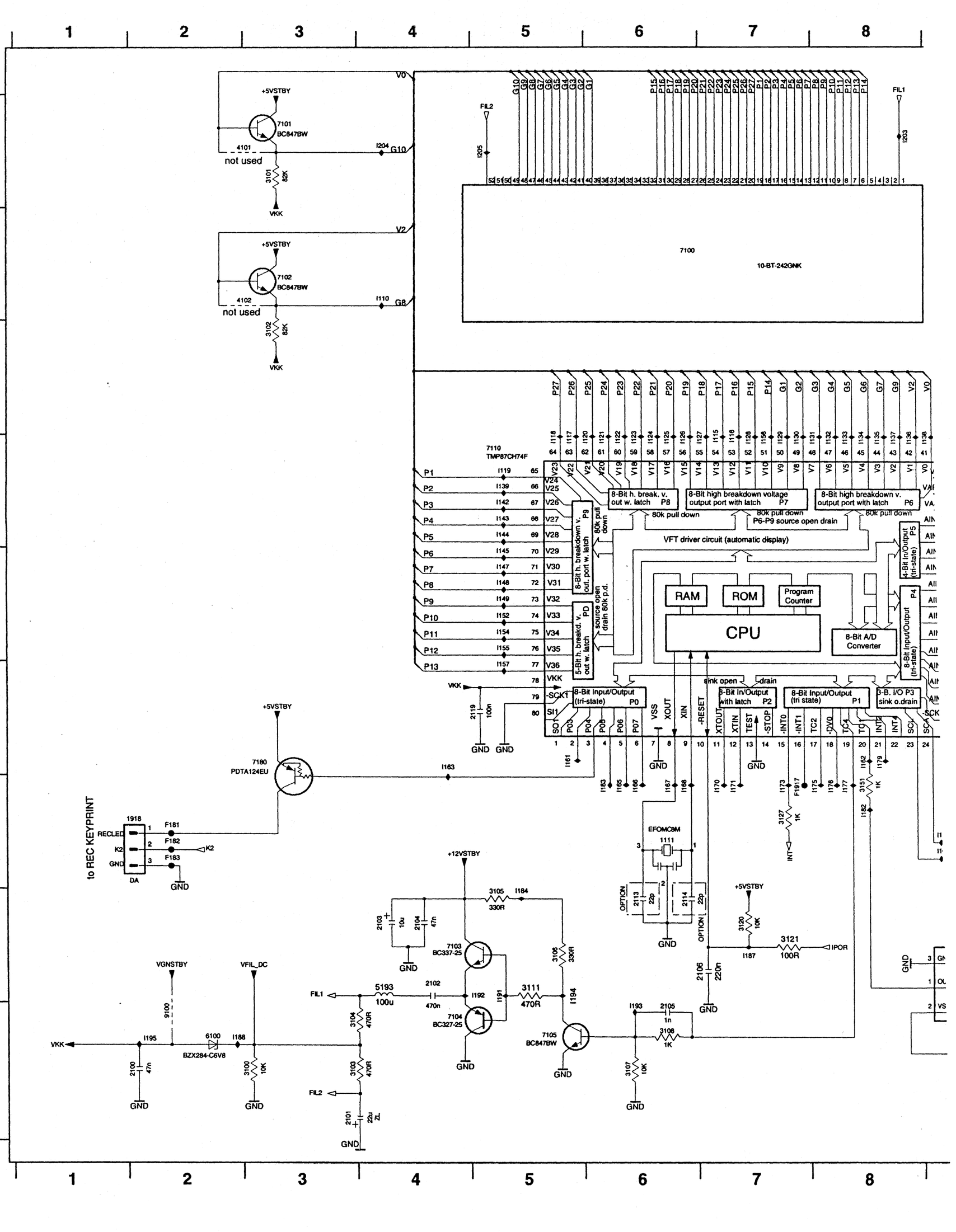
5100	4822 157 11717	BLM31P500SPT
5101	4822 157 11717	BLM31P500SPT
5102	4822 157 11499	BLM11P600SPT
5103	4822 157 11499	BLM11P600SPT
5200	4822 157 11499	BLM11P600SPT
5201	4822 157 11499	BLM11P600SPT
5202	4822 157 11499	BLM11P600SPT
5203	4822 157 11499	BLM11P600SPT
5204	4822 157 11499	BLM11P600SPT
5205	4822 157 11499	BLM11P600SPT
5207	4822 157 11499	BLM11P600SPT
5208	4822 157 11499	BLM11P600SPT
5209	4822 157 11499	BLM11P600SPT
5300	4822 157 11499	BLM11P600SPT
5302	4822 157 11499	BLM11P600SPT
5400	4822 157 11499	BLM11P600SPT
5402	4822 157 11499	BLM11P600SPT
5403	4822 157 11499	BLM11P600SPT
5404	4822 157 11499	BLM11P600SPT
5500	4822 157 11499	BLM11P600SPT
5501	4822 157 11499	BLM11P600SPT
5502	4822 157 11499	BLM11P600SPT
5503	4822 157 11499	BLM11P600SPT
5504	4822 157 11499	BLM11P600SPT
5505	4822 157 11499	BLM11P600SPT
5506	4822 157 11499	BLM11P600SPT
5507	4822 157 11499	BLM11P600SPT
5508	4822 157 11499	BLM11P600SPT
5600	4822 157 70651	12µH (NL322522T-120J)
5601	4822 157 70651	12µH (NL322522T-120J)
5602	4822 157 70651	12µH (NL322522T-120J)
5603	4822 157 70651	12µH (NL322522T-120J)
5604	4822 157 70651	12µH (NL322522T-120J)
5605	4822 157 70651	12µH (NL322522T-120J)
5606	4822 157 70649	4.7µH (NL322522T-4R7J)
5607	4822 157 70649	4.7µH (NL322522T-4R7J)
5900	4822 157 11717	BLM31P500SPT
5901	4822 157 11717	BLM31P500SPT
5903	4822 157 11499	BLM11P600SPT
5904	4822 157 11717	BLM31P500SPT
5905	4822 157 11499	BLM11P600SPT
5907	4822 157 11499	BLM11P600SPT

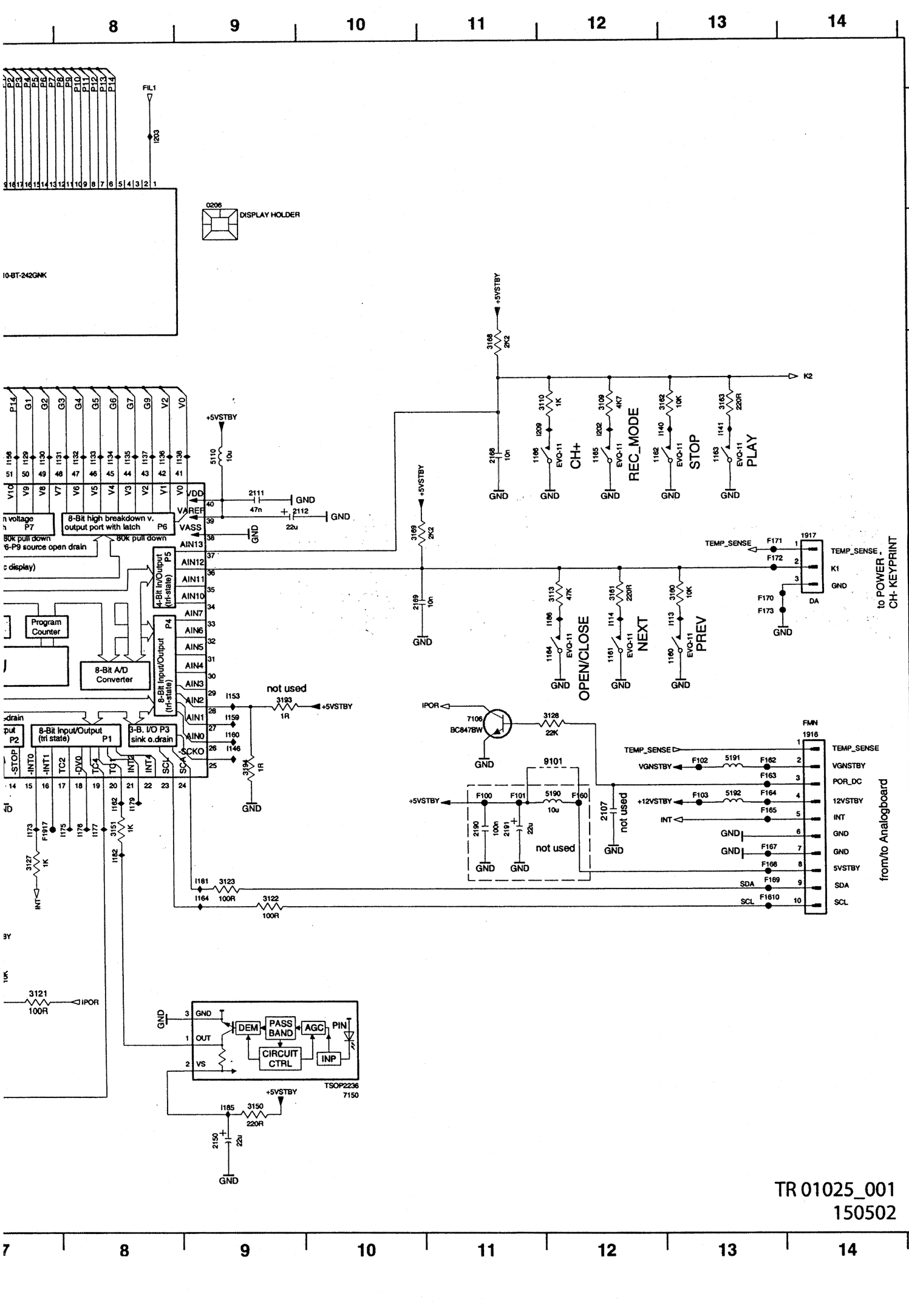
6500	4822 130 80622	BAT54
6900	4822 130 80622	BAT54

7100	9352 692 48557	IC SM SAA7333HL/M1 (PHSE) Y
7101	9322 166 67668	IC SM MT48LC4M16A2TG-7E(MRN0)R
7102	5322 209 16384	PC74HCT9046AD
7103	9322 170 16685	IC SM NC7SZ58 (FSC0) R
7104	9352 456 50115	HC1G04
7200	9322 169 81671	STI5508EVB
7201	9322 130 41668	IC SM M24C64-WMN6 (ST00) R
7202	4822 209 30212	PC74HCT125T
7203	9322 142 88668	IC SM LF25CDT (ST00) R
7300	9322 166 67668	IC SM MT48LC4M16A2TG-7E(MRN0)R
7303	9352 499 60118	IC SM 74LVC00AD (PHSE) R
7402	9322 166 67668	IC SM MT48LC4M16A2TG-7E(MRN0)R
7403	9352 701 80557	IC SM SAA6752HS/V101 (PHSE) Y
7404	9322 142 88668	IC SM LF25CDT (ST00) R
7500	9352 673 95518	IC SM SAA7118E/V1 (PHSE) R
7501	9352 500 60118	IC SM 74LVC32AD (PHSE) R
7502	5322 209 71589	74HC74D
7504	5322 130 60159	BC846B
7600	5322 130 60159	BC846B
7601	5322 130 60159	BC846B
7602	5322 130 60159	BC846B
7603	5322 130 60159	BC846B
7604	5322 130 60159	BC846B
7605	5322 130 60159	BC846B
7606	5322 130 60159	BC846B
7702	9352 501 00118	IC SM 74LVC86ADB (PHSE) R
7900	9322 151 71668	IC SM MK2703STR (MICL) R
7901	5322 130 60159	BC846B
7902	9322 165 15685	IC SM NCP303LSN30 (ONSE) R
7904	4822 209 16399	74LVC04AD
7905	5322 209 71568	PC74HCT14T
7906	4822 242 10838	27MHZ 120P FX0-31FT

7. Circuit Diagrams and PWB Layouts

Display Panel





0206 A9
1111 G6
1160 E13
1161 E12
1162 D12
1163 D13
1164 E12
1165 D12
1166 D11
1916 F14
1917 D14
1918 G2
2100 I2
2101 I3
2102 H4
2103 H4
2104 H4
2105 I6
2106 H7
2107 F12
2111 D9
2112 D10
2113 H6
2114 H6
2119 F5
2150 I9
2168 D11
2169 E10
2190 G11
2191 G11
3100 I3
3101 A3
3102 C3
3103 I3
3104 I3
3105 H5
3106 H5
3107 I6
3108 I6
3109 C12
3110 C12
3111 H5
3113 E12
3120 H7
3121 H7
3122 G9
3123 G9
3127 G7
3128 F12
3150 I9
3151 G8
3160 E13
3161 E12
3162 C13
3163 C13
3168 C11
3169 D10
3193 F9
3194 F9
4101 A3
4102 B3
5110 D9
5190 F12
5191 F13
5192 F13
5193 H4
6100 I2
7100 B6
7101 A3
7102 B3
7103 H4
7104 I4
7105 I5
7106 F11
7110 D5
7150 I10
7180 F3
9100 I2
9101 F12
F100 F11
F101 F11
F102 F13
F103 F13
F160 F12
F1610 G13
F162 F13
F163 F13
F164 F13
F165 F13
F167 G13
F168 G13
F169 G13
F170 E14
F171 D14
F172 D14
F173 E14
F181 G2
F182 G2
F183 G2
F1917 G7
I110 B4
I113 E13
I114 E12
I115 D7
I116 D7
I117 D5
I118 D5
I119 D5
I120 D6
I121 D6
I122 D6
I123 D6
I124 D6
I125 D6
I126 D6
I127 D7
I128 D7
I129 D7
I130 D7
I131 D8
I132 D8
I133 D8
I134 D8
I135 D8
I136 D8
I137 D8
I138 D9
I139 D5
I140 C13
I141 C13
I142 D5
I143 D5
I144 D5
I145 E5
I146 F9
I147 E5
I148 E5
I149 E5
I152 E5
I153 E9
I154 E5
I155 E5
I157 F5
I158 D7
I159 F9
I160 F9
I161 F5
I162 F8
I163 F4
I164 G9
I165 G6
I166 G6
I167 G6
I168 G6
I170 G7
I171 G7
I173 G7
I175 G8
I176 G8
I177 G8
I179 F8
I181 G9
I182 G8
I183 G6
I184 H5
I185 I9
I186 E12
I187 H7
I188 I2
I191 H5
I192 H5
I193 I6
I194 H5
I195 I2
I202 C12
I203 A8
I204 A4
I205 A5
I209 C11